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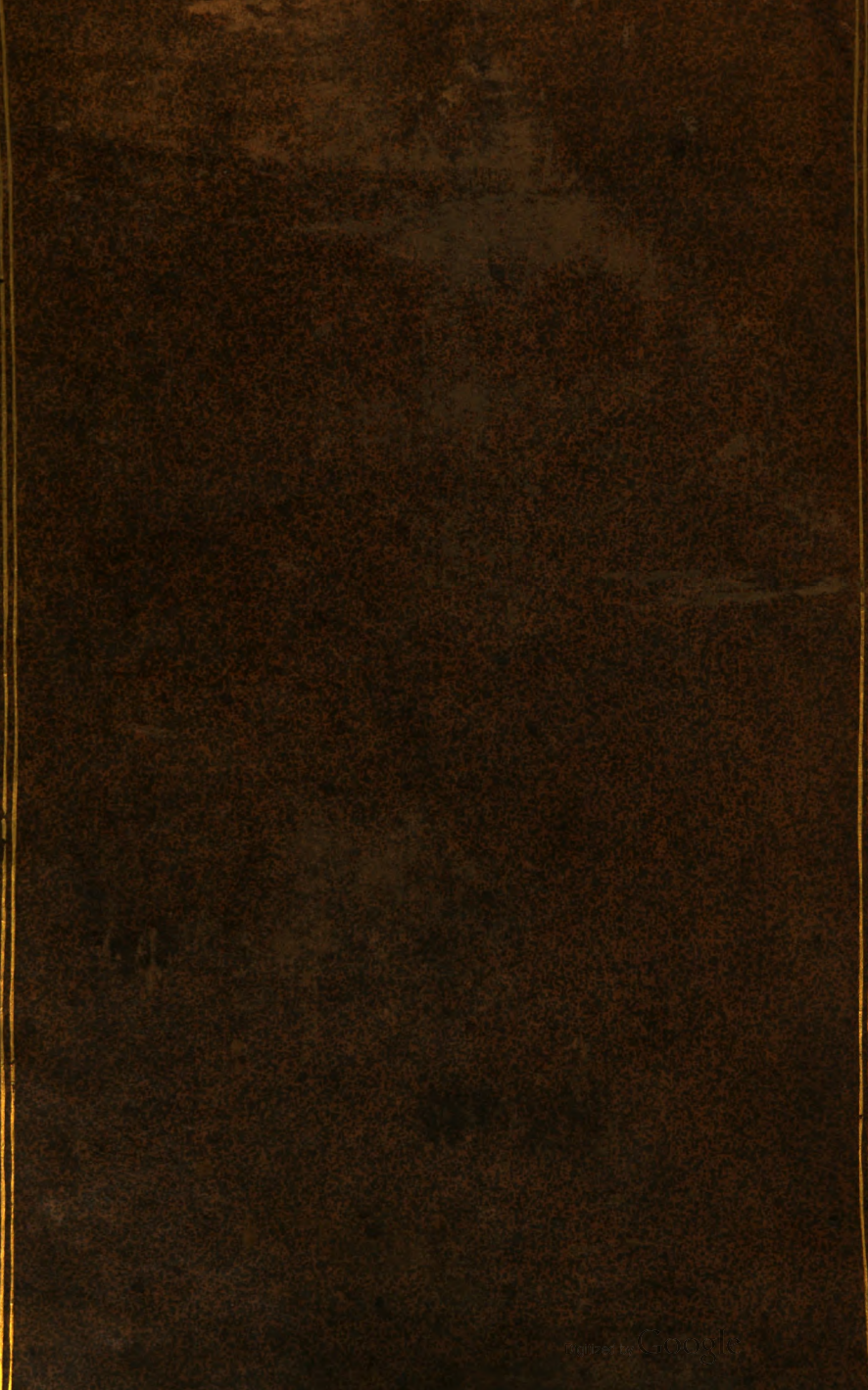
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A
COMPLETE BODY
OF
HUSBANDRY.



A
COMPLETE BODY
OF
HUSBANDRY;
COLLECTED

From the *Practice* and *Experience* of the most
considerable FARMERS in *Britain*.

Particularly setting forth

The various WAYS of Improving LAND, by *Hollow
Ditching, Dreining, Double Plowing, Grazing, Enclos-
ing, Watering and Manureing.*

WITH

Particular DIRECTIONS for the Fertilising of *Broome-
Ground, Heath-Ground, Furze, Bushey, and Chiltun-
Ground*: Also the METHOD of Improvement, by assort-
ing proper Plants to Lands, and of shifting of Crops.

To which is added

Several Particulars relating to the Preservation of the GAME;
and stated Accounts of the Expence and Profits of Arable, Pasture,
Meadow and Wood Lands.

Adorn'd with CUTS.

By R. BRADLEY, Professor of Botany in the University
of Cambridge, and F. R. S.

L O N D O N:

Printed for JAMES WOODMAN, and DAVID LYON,
in *Russel-Street, Covent-Garden.* M.DCC.XXVII.

T H E

P R E F A C E.

T*HE business of husbandry and farming being a study of the greatest importance to the people of all nations, but particularly to those of our own country, it is necessary that every one should contribute towards the improvement of so useful a science. I shall therefore make no apology for attempting a work of this nature, nor attempt any excuse for devoting the greatest part of my time in searching into the most*

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difficult and most useful parts of it ; especially since I find that there is so great variety in the practice among the farmers of the several counties, and that there is not yet published any complete work of this kind.

Mr. Mortimer, among the late writers on this subject, has laid the best plan for such a design ; but that gentleman frankly tells us, that the greatest part of his work is collected from authors : however, it is certain that his choice is made with judgment, except in a few particulars, and those seem to have been owing rather to the want of care in the printers, than Mr. Mortimer's want of judgment. One of them in
par-

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particular is relating to a plant, which in his book is called the Maternus, mistaken for Alaternus: for there is no such plant in nature as Maternus, and the mistake might easily be made by the printer from the manuscript copy, for the capital letter M and AL may sometimes in writing shew very little different. But it is far more strange, that a gentleman so curious as Mr. Laurence, should in his folio volume of husbandry and gardening, copy that error in Mr. Mortimer, and give us the whole paragraph concerning the culture of the Maternus; when he has told us in his preface, That his book is not designed to amuse, but to instruct, being filled with TRUTH, not fancies. And likewise to give us

another distinct article concerning the culture of the Alaternus, as if by the Alaternus and the Maternus were meant two things. It is surprising, I say, that one of Mr. Laurence's Speculation should not see through the mistake, but venture so rashly to give us the culture of we know not what ; nor do we find his description of the Guernsey lilly to answer by any means the colour of the flower, so that 'tis to be feared he has been imposed upon designedly ; for it is plain that he never saw the flower, as appears by his account of it, page 424.

As for some particulars which Mr. Laurence has thought worthy transcribing from my works, they have

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have been experienced in many places, and I am obliged to him for his acknowledging me the author of them. But in many others which he has taken from me, without any acknowledgment, he seems to have mistaken my meaning, especially in the article relating to the transplanting of fruit-trees in summer, by the help of gums, vegetative mummies, soap, &c. in fine earth made into a pap with water. In my writings I have prescribed the gums which are recommended by Dr. Agricola, or soap to be put to the wounded parts of the roots of trees ; but as few of the roots as possible should receive any wound or hurt when the tree is taken up, for the more fibres remain about
the

the root, the better will the tree prosper; these I direct to be removed without any earth about the roots, and then plant in a pap made of fine earth and water. But this is a work for the summer, for then they strike root again in two or three days; but it is not proper to give them this charge of wet in cold weather, for that will be a means of chilling and rotting the small fibres: so that February and October, which have cold and frosty nights, and are the months which Mr. Laurence would have this work done in, I do not esteem proper, nor have I mentioned them as such; but the other part, as far as Mr. Laurence relates, I published three or four years before he wrote up-
on

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on this subject, in my monthly writings. I think my self obliged to take notice of this, because by mistaking the time of transplanting with pap or fine mud, our labour will be fruitless. For the right method of doing it, I refer to the account I have published, as it is practised by Mr. Secretary Johnston of Twittenham, by which it may be known, whether any part of this prescription is Mr. Laurence's, as he pompously affirms, page 349, 350. except the wrong seasons of planting. There are many other things which this gentleman has borrowed from my writings on the gardening account, which those who have my New Improvements of Planting and Gardening may easily discover, and should

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should observe, least, as they are intermixed by Mr. Laurence with the works of other authors, my design in them may happen to be mistaken.

But I shall now proceed to acquaint my reader with what he is to expect in the following work.

*In the first place, as to the design, viz. a Body of Husbandry, I have chiefly gathered it from farms of the best account in England; and where I have taken any thing from any author, I have paid him all due honour and respect; but I have had very little opportunity of paying any my compliments, except Mr. Fitz-Herbarde, who was the
first*

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first Englishman that wrote concerning husbandry, and him I have frequent occasion to mention for some very good directions, which I have given in his own dress of two hundred years old.

I have endeavoured to set forth the several kinds of improvements that may be made upon lands, in the most familiar way, and class'd them in proper order for the greater ease of the reader; and particularly have taken occasion to direct that excellent and cheap way of dreining of wet grounds by hollow ditching, which is now practised in Essex, and has not yet made its way much farther.

I have

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I have also explained the method of making pot-ash, a most profitable commodity, by which the few who have practised it have got great estates ; and there is room enough yet for many others to do the like.

I have also very fully set forth the advantages of enclosing of lands, and have laid down the most secure and profitable methods of doing that work ; and likewise have endeavoured to correct some errors which are frequently committed in the granting of leases, both to the disadvantage of the landlord and the tenant.

And

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And particularly have stated the account debtor and creditor, of the pence and profits of farms, whether they consist of arable, meadow, pasture, or wood-lands ; with the particulars relating to the stocking of every sort of farm, and the expence of it. And as I have taken all imaginable care to render this work useful and profitable to all who are concerned in the business of husbandry, so I doubt not but it will meet with a favourable receptance.



A Com-

A
COMPLETE BODY
OF
HUSBANDRY.

C H A P. I.

*Of Soils, Water, Air, and Heat,
their Influence over Vegetables.*

THE business of this chapter is to inform my reader of the nature of soils, or earth, which some are of opinion is the principal element that concerns vegetation; but let a soil be what it will, it cannot cause any seed to germinate or sprout, without the help of water, air and heat.

B

To

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To prove this, take dry sand, or any earth which is baked or dried by the fire or sun, so that no moisture remains in it, and keep this earth in a place where air, water or the sun cannot come at it; then sow seeds in that earth, and the seeds will not sprout, but the earth will help to preserve the seeds, as we find in the instance of Mustard-seed in Essex, and some parts of Kent, which has been dug out of the earth about one hundred foot deep, and upon being exposed to the air and sun has come up, which some people have mistaken for spontaneous vegetation; but that every one may be satisfied in this case, I shall put it within compass of their trial. Dig a piece of ground four or five foot deep only, and sow at the bottom of the trench Mustard-seeds, Lettice-seeds, or any other sort that may happen to be the nearest at hand, and sift as fine or as rich earth as you can imagine upon the seeds till the trench is full, and the seeds will never sprout, nor rise; but take these seeds up several years afterwards and sow them in a proper depth, as an inch, two, three or four, according to the strength and largeness of the seeds, and they will sprout; for besides what ought to be regarded with respect to the allowing light and thin seeds, a very shallow covering of earth to sprout or hatch in, we may consider that within the reach
of

of a few inches, the earth is within the influence of the rain, air and sun; and some require to be much nearer these elements than others. Some eggs of animals require more heat than others to hatch them, but as they happen to be the bodies of the birds or fowls they relate to, have always power of heat enough to do it. So in the propagation of fish, the spawn of the several sorts require different depths of water to hatch in, or they will never come to be fish; all which depends upon the same rule of nature, where the one thing is more properly placed in one element than another; yet the laws of nature are all harmonious, and must always be judged of in proportion, as that one thing will bear a degree of moisture more than another: for example; plants that grow in rivers, will live in water, and no otherwise; and those that grow upon stones will rot in water. The Quince or Pine-apple, will live in the open air, in the hottest parts of the world near the equinoctial line, but will not subsist or live at all if it is exposed to the air and sun in our climate, where we are forced to nurse it carefully to bring it to perfection. Instances of this kind may shew us, that all the elements ought to be considered in several degrees by the husbandmen and gardeners. Earth is more or less stiff or

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light, heat in its proportions more or less violent, water finer or thicker, and air more dense or rarified, or refined : For considering the vast variety of bodies which these elements are ordained to support, there seems a necessity that every one of these elements should have a power in greater or lesser degrees to operate ; for were they to be fixt, or without their opposites, there could be but four sorts of beings in the world ; all fish must be of the same nature that had but one sort of water to live in, for we exclude their food of insects, &c. So in the air, if it was always to be in the same state, but one sort or degree of insect could live ; and the earth, all of one sort, would produce only one sort of plant ; and for fire, we know not what bodies will live in it, or are reduced by it ; notwithstanding the story of the Salamander, the Phoenix, &c. which are known to be fables ; tho' in some of the merry virtuosi's museums we have things shewn for them. All that we know of the force of fire is, that a diamond, the stone, porphyry, and some other bodies cannot be consumed by it.

BUT I am next to consider, what influence water has upon earth in respect to vegetation, or the growth of plants. If we take earth singly, and not partaking of the
other

other elements, viz. water, air, and fire, which we call heat; any seed put into it will remain in that earth without motion, and never sprout, as I have experienced, and is easily within the power of any one to try. But if we add water to it to give the earth a moisture, and keep both the earth and water as close as can be from air and heat, the seed will rot, and the earth will have a fætid smell; but if we put the seed into such earth, and a due proportion of water (for every sort of seed has a particular demand for moisture, and must have a certain proportionate share) and we give that earth and water the benefit of the air, then the seeds will come up, if the air is warmed with any share of heat. Now we must know that the earth is a nidus, or nest, for the seeds to hatch in, but it is not fit for hatching, without the assistance of water; and water has always some air in it, so we cannot water any such dry'd earth, but there must be at the same time a small share of air; but as the water is the greater body, it overcomes the less, and both become stagnant; and when we allow the mixture of earth and water the freedom of the air, then they have life and action; for the air, which the water carries with it into the earth when they are both shut up from the ambient air, has no power of action, or soon loses it: And now, we al-

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low earth, water, and air to assist in the hatching or making a seed sprout; but if we do all these in a cold winter season, when, and in such a place as we have no influence of sun or heat, the seed yet will not stir; but as soon as the sun approaches, and warms the air, then we shall find our plants willing to spring or come up. I speak now of plants which are natural to such climates as reach from the latitude of fifty two or three degrees, to the line; these, I say, will not stir till they find a warmth agreeable to their nature; from whence I again conclude, that the earth is only a nidus, or a nest, for a plant to be in, which can have no other effect upon it than to keep it steady, without the assistance of water, air, and heat; and so I cannot agree with Mr. Laurence's opinion, that earth has more in it than what I say, for I am persuaded if he had had more experience in the culture of plants, he would not have started the difficulty about it, which he has done in his late folio volume of Husbandry and Gardening. For my own part, I appeal to all men who may make themselves judges by the easy trials I shall direct them to.

BUT while I am upon the subject of water, I must take notice that we have plants of different natures, as well as animals of different natures; we have some plants which

which live altogether in the waters, and do not even take root in the earth below them, as the Duck-weed, or *Lens Palustris*; but even this will not live, as I have experienced, without the assistance of earth at the bottom to support the water: And the same I have observed in the keeping of young fish, the bare water will not support them, unless earth is at the bottom of the ponds or tubs where we propose to cultivate either of these in; so that we find earth is as necessary to assist the water, as I have said before, water is to assist the earth. But we must remember that these two, without the concurrence of air and heat, will be stagnant and do no business; but we have plants also that require a very small share of water. The wild thyme, and many others that every one knows, loves dry land; but if that land has not the benefit of showers now and then, those plants will not live; which may be tried by planting one of these in a pot, and keeping it entirely from water, the plant will dye, altho' it has the benefit of air and heat. But from the plant which requires the least share of water, to that which cannot live in any thing but water it self, there are others which require their several proportions, one more, the other less; a great deal to one sort will drown it, and to another give nourishment.

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THIRDLY, let us examine what influence the air has over vegetables; in the culture of such plants as are thick in their leaves, or are what we call succulent or juicy, their bodies are for the most part spongy, and they gather so large a share of wet from water which happens in their way, and from dews and such like dense air, that they can maintain themselves the best of any plant, if they are shut up or enclosed from the air. The Sedums or House-leeks will fall asleep, as one may say, or stand still in their growth, if we debar them from air; but let them have air, on a suddain, tho' in the colder seasons, they will presently feed themselves so well, that they will sling out roots even into the air it self; the Sedum Arborescens, and others of the same tribe of plants which are obliged to us for a warm house in the winter, shew us what I say. Nay these plants, to shew us how necessary air is to maintain life in vegetables, if we break off a branch or a leaf of some of them, and let them remain in a dry place in a house, they will always put out roots on the approach of wet weather; and as long as that disposition of moist air continues, those roots will continue growing, but as soon as the air begins to be less dense or thick, and rarifies, or becomes dryer and lighter, those roots dry up, and grow no more till the next thick or moist
air

air happens. But though I talk of a house in this particular, we are not to suppose that they would not do the same if they were in the open air, if they were all natives of this climate, but however in the summer-season, they may hang abroad, and they will do the same ; they may be called hydrometers, for they foretel the moisture of the air.

BUT to go a little farther in the business of air with respect to the welfare of plants ; I find by experience that if I shut up a plant from the air and exclude the air as much as possible from it, it will decline by degrees, and grow pale or yellow, and lose its verdure, and at length turn white and die, notwithstanding it has sun or heat, and water and earth to stand in. This is an experiment easily proved, and in the summer time may be frequently observed, when plants are brought into houses to be set in chimnies two or three weeks, will not only change their countenance but very likely will put them past recovery ; and in this case the plants have yet some air, but yet not a freedom of air, and for want of that, I am persuaded, many men as well as plants, have died, if they have been used to it and happen to retreat from it or be confined. This I could prove by many experiments, but as far as it relates to the subject I am upon, I have

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have put it into the hands of my reader to satisfy himself with very little trouble.

BUT let us now consider how far heat is helpful to vegetation or the growth of plants. We have already seen that seeds or plants, will not sprout or grow in earth only, and plants will surely die, if they have not the benefit of water ; and also we find that plants or seeds will surely rot if they have earth and water without air, and even all these three elements together, if the air is pent up or does not pass with freedom, will not keep a plant alive ; but if we yet allow all these elements in the greatest freedom, a plant will not grow without heat in some degree or other, which must answer to the nature of the plant, or to the climate the plant is natural too. This we experience in the culture of foreign or exotick plants, we are obliged to give them such artificial heats as are agreeable to that which is in the climates they were brought from, and this must be nicely calculated ; for if we give them too much or too little, we kill them. And that such due proportions of heat may be given to every sort of plant that comes from abroad, as may be serviceable to them, the Thermometers sold by Mr. Fowler, mathematical-instrument maker, in Swithen's-Ally, near the Royal-Exchange, London, are of extraordinary

dinary use; and without them there is no cultivating, with certainty, that delicious fruit called the Ananas or Pine-Apple, or any other of the choice fruits from the East or West Indies; for if the climate is once known from whence any plant is brought, these glasses will shew what degree of heat the plant ought to have, and so the fires in the stoves, or green-houses, must be regulated accordingly.

WE find likewise that the presence of the sun is not absolutely necessary for the growth of plants; for if they have the artificial heats I speak of, and the house where they are set in is covered a month together, so as to keep out the sun, yet the plants will grow by means of the heat of the fires under the house, and will even bring fruit to perfect growth and ripeness, but the juices of the fruit will be flat and insipid, unless it has the sun's presence, and then the fruit will be well tasted and highflavoured; so that the sun's presence is of use to help the fine flavour in fruit that is not necessary for the growth of plants. We find in all shady places, that plants grow extremely luxuriant, and have a finer verdure in their leaves, than if they were to be exposed to the face of the sun. I speak of plants which are natives, or else are brought us from such climates that they will bear the natural

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natural air of our climate: but though such plants will grow with great vigour in shady places, yet their juices will be raw and undigested, and the plants will not therefore set for blossom, or bear fruit; but those of the same sort which are growing in such places where they can have the full influence of the sun, will by that means have their juices sooner ripened and digested, and consequently come to bear fruit much sooner than those plants will do that grow in the shade, and likewise those plants which have the great influence of the sun, by having their juices ripened or thickened by the heat, must consequently be shortened in their growth or have the shoots sooner finished than the same kind which is growing out of the sun's way.

BUT in this time of growth we must observe that the whole body of air is warmed, and by that means it is only that plants will grow in the shade; for as we have observed above, earth, water and air together, without warmth, will not occasion the growth of plants: for which reason it is that we find the growth of plants is stopt in the winter, the sun's warmth then not being sufficient to move their juices with fluency enough to make them shoot, though in a mild winter we shall sometimes find warmth enough to set some plants in action.

We

We are to observe likewise, that the plants which are familiar with our climate, their seasons of growth are not in the hottest weather, no more than in the coldest, but in the temperate seasons; for about June, and the beginning of July, they have finished their first shoot, and then stand still in the head or top for a month without shooting at all, only in their roots; and from the middle or end of July to the end of September, they make a second shoot, and then lye quiet all the winter; from whence we may judge that a great share of sun is not so much for the growth of plants, as for the ripening of fruit; for without a great share of sun, fruit cannot be well flavoured; and with a great share of sun, plants will not grow luxuriantly, but a medium will help both the ripening of the fruit, and the growth of the plant; and even in the culture of the West Indian fruits, if we do not give them free air in the heat of the summer days, their leaves will scorch.

WE find likewise that Myrtles, Mintle-tree, the Night-shade, and some other plants will grow and strike roots by being set only in water without earth, but then there must be the concurrence of air and warmth; but plants in this case will not bear any seeds, which is the chief end of vegetation, though they will enlarge themselves from the air
and

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and water, and continue a weak growth for a time, but will not long endure.

FROM these arguments we may conclude that without the concurrence of water, air, and heat, no plant will grow in the earth; nor tho' plants have the assistance of water, air, and heat, yet without the concurrence of earth, they will come to no perfection. From whence it appears that earth is a necessary nidus for plants to hatch in, or a station for them to be in. That water and air are nourishing to plants, but that neither of these can be profitable to plants, till they are put in action by heat or warmth. Earth then is a necessary body to receive the influence of all these, viz. water, air, and heat, and therefore it is that such earth may always be esteemed the best or most favourable to the growth of plants, which will readily receive the influence of water, air, and heat, and not part too soon with them, but by gentle degrees distribute its virtues to the plants that are placed upon it: therefore all the very stiff clays are not good because their parts are so bound together with viscous matter, that neither water nor air, nor heat, can temperate them, which is the reason why such soils bring their crops later than others. The highest sands neither can be reckoned good, because tho' they will readily receive impres-

impressions from all these elements, yet such a soil has not tenacity enough to retain them; then the middle soil, such as I call loam, or mother-earth, may be esteemed the most desirable soil, because it is composed equally of the too binding and too light soils. Clay and sand is adapted to receive the influence of water, air, and heat, and to retain those good properties, till plants are advantaged by them.

ALL soils are more or less light or heavy, and are of many kinds; for which reason, each kind is more proper for one plant than another, some plants loving very light earth, and some delight chiefly in the stiffest clay, and between one and the other of these extremes, we may reckon as many varieties as there are diversities of plants growing upon the face of the earth; for every plant has its favourite soil, wherein it will prosper better than in any other. However we find that the medium between the two extremes of sand and clay, will keep a plant of any sort, by being neither too heavy nor too light.

THE soils which I shall here take notice of, are consisting either of sandy parts only, or of such parts as we find are the result of bodies, whether vegetable or animal, putrified or reduced, or of these two mixed together; the lighter of them are
sands,

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sands, and they all partake more or less of it.

SANDS may be distinguished by the round or running sand, such as we use for sanding of letters or hour-glasses, and sharp sand which has many angles, such as scouring sand or drift sand. The round sands are either black, white, grey, yellow, or red; these sands, where ever they are found upon the surface or the staple of the ground, are for the most part very deep, and I believe always so; for in all my travels and enquiries, I never found them otherwise. When we find these on the surface of lands, we commonly find Heath, or Ling, or Broom, or Furze, or Goss, growing upon them, and then they are commonly mixt near the surface, with parts of vegetables, as the fallen leaves or roots, which make the sand rich with vegetable qualities; but as it is light by these means, it can be only made to receive the good effects of water, air, and heat, and retain them long enough to assist and nourish what is planted or sown upon them of fibrous-rooted plants, by strengthening it with some matter that will bind it, or give it a share of viscosity, such as binds the clays so hard together; but this viscous matter what-ever it is that we lay on it, must be discreetly laid upon this kind of light earth, least we bind it too much, for then

then we shall have as bad an occasion to complain on the other side. The proportions I shall set down in the chapter following relating to manures.

NEXT to these round or soft sands, as they are called, we must reckon the sharp sands above-mentioned, we have few of these that are of any other colour than white, yellow, or red; and it is rare to find any thing ever growing upon them unless they happen to be mixed with some of those earthy parts which I have mentioned above, of rotted vegetables or animals: however these are no less capable of improving or being improved, than the foregoing soft sands, as I shall instance in the following chapter; but we must note that these sands of themselves bind with wet, but being mixed with clay, will open the clay.

AFTER these we come to the gravels, which to consider simply, are made of such sands as we have mentioned before: these however are mixed with stones, and those stones partake commonly of the figure of the sands. We have of these gravels four or five sorts simply without mixture, viz: the sharp or angular red or yellow gravel, the round stoned red or yellow gravel, the angular or flinty black gravel, the round stone or pebble black gravel, and a grey
C coloured

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coloured gravel. The observations I have made upon these gravels are, that of the tree or shrub-kinds, which happen to grow upon them, are generally ever-greens, such soil as this sure can do nothing toward the nourishment of a plant of its self; but it can keep a plant steady, and can receive the influence of water, air, and heat, from the sun, by which means it provides nourishment for the plants in the two first, and prepares or cooks them by the last. And I suppose that a very small share of heat, is necessary to put the plants I speak of in action, i. e. the race of those which have turpentine juices, such as the fir, pine, pinister, &c. because upon all the coldest mountains in the world which are covered with snows in the midst of summer, these grow and prosper, even the cedar of Lebanon; so that it does well with us, notwithstanding it comes from one of the warmest latitudes, whose plants growing at the bottom of the mountains, must have as much warmth in the winter, as we allow to plants brought to us from the West-Indies. But it is observable that those ever-greens which have resinous or terebantine juices, let them come from any part of the world, will despise the frosts of our climate. This I first learnt from a great philosopher of our times, ~~and~~ Parker, Esq; who has spared neither cost

cost nor pains, in the trial of every kind of plant, which he can collect from all quarters of the globe, in his gardens near Croyden in Surry. But as another curious gentleman observes, no viscous or slimy matter will freeze ; by which rule snails and slugs are never destroyed by the frost ; and the mistletoe, which is the viscum, grows and even is in the height of its prosperity in the frosty part of the season ; but this plant always grows upon another plant, and never in any earth : so that it may have more viscous juices by drawing its nourishment from the sap of plants when their juices are in the thickest state.

WE may suppose likewise that gravels simply cannot afford such a large share of nourishment to any plant as would fill it with watry parts ; for if this was the case, such plants as I speak of could not thrive there, whose juices must be viscous, such as birdlime or turpentine. In our own nation we have an instance of firs, which grow prosperously upon a hill of pure round or soft sand, at the Earl of Ailsfords, near Guilford in Surry ; and the tryals which several gentlemen have made of the like sort in England, I doubt not, will justify sufficiently what I have said. And abroad we find, that such trees as the fir, the pine, pinister, &c. grow frequently in the cran-

nies or clefts of rocks, and with very great luxuriance, so that even rocks may produce something beneficial; so then gravels, as simple as they may be, will not produce a less valuable crop. The improvement of these for corn, are by laying on them earth to bind them, and that may be of the stiffer sort, as I shall explain in the following chapter; for this sort of gravel wants a body, and therefore any sort of earth helps to improve it for corn, pulse, &c. But besides the gravels I have mentioned, there is a scaly sort of gravel which seems to be composed of mouldering stone, or sort of white slate, which may be helpt as the gravels above. It must be noted, that these gravels, as well as the foregoing sands, are stiled hot or cold, as they are less or more subject to waters. All sands and gravels that have not springs of water, are called hot sands and hot gravels; and on the contrary, those sands and gravels which are springy and annoyed with waters, are called cold sands and cold gravels. Again, it must be observed that all the gravels I speak of, have a covering of some soil or other, but it is seldom that the staple is above an inch or two deep; however they are made to bring good crops, by manuring them well with earth.

THE next soils to the gravels for openness, are those which are called chilturn, and
in

in some places scarry and scaly ground, and in Essex malmy ground; this is a stony soil mixed with earth, or such a soil as is generally of a good temper, neither too light nor too heavy, but such a soil as I call loam or mother earth. This soil would need little manuring, if it was of any considerable depth, but it is generally a shallow staple, and has a stony bottom; so that to attempt the clearing it of stones can be of no advantage, because upon every ploughing, there will be others rise up; the improvements of this ground is therefore to raise the staple as much as possible: and with this sort of land we may also place the dry mouldering chalk, which is generally mixed with it, or has a staple or covering of light loamy soil upon it.

THE next soil to these, is the loam or mother earth, simple, or without mixture: This, as I observe above, is the medium between sand and clay, and is commonly of a deep staple, with a clay bottom, and now and then a vein of gravel; this is the richest of all other soils, being open enough to enrich it self by the influence of rain, dews, air, and heat, and being binding enough to keep the virtues it gains from such powers from expending themselves too quickly. In this soil there begins to appear some share of viscus matter, which is a token of richness,

22. A COMPLETE BODY

as well as a certainty of stiffness in some degree. We ought in all attempts for the improvement of lands to consider, that if they are very stiff, like the blue clay, or other clays, the parts of such clays should be opened and broken; for those clays are full of rich juices, but have them so locked up or bound by the viscous matter which prevails in them, that they cannot distribute their virtues to the plants that are set in them; and also this great stiffness prevents the operating of the water, air, and heat upon the soil. So the earths which are very light and open, should be bound a little, that they may retain their virtues; that is, one should be opened, and the other bound, till we bring both to the temper of the loam I mention.

THERE is another sort of loam which is much stiffer than that sort I have mentioned, which in some places is called clamp or strong loam, and is a good earth for making of bricks; when we find this, we may expect to have it run a great depth. This is accounted a very rich soil, and especially for corn and grass, and in the hands of an understanding farmer will never wear out, but will bear now and then a little refreshment or manuring from some of the lighter soils: their clamp or stiff loam, as well as the lighter loam before mentioned, is commonly

ly of a yellow colour, and also of a black, and sometimes of a grey or a white; which last two some take for margle, or marle; the black is esteemed the richest of them all, and is that pinguid soil so much esteemed by the ancient writers of husbandry: where these fat soils are found, the farmers must needs have rich crops, and bad roads. These sorts of soils are deep in staple, and have generally a vein of sand under them, or gravel, and that commonly is full of water.

AFTER these we come to the clays, for marles are never on the surface of the earth, they all lie in beds some depth under the surface, and commonly are found in wet places, for the most part under sandy or light ground; for I have not found any under clays, nor heard of any that have been found under clays; but these I shall speak of in another place. The clays which I shall here mention, are either white, grey, yellow, red, or blue: That which we call white clay, has every property of the fat chalk; and therefore according to my Lord Bacon's reasoning, this white clay is chalk; for Lord Bacon says concerning the attempts towards the making of gold, that what ever can be found to have every property of gold, is gold; and so indeed of every thing else. This white clay is unctuous or viscous, and brings good crops of corn with

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frequent stirring, and enriching with such things as will open its parts : It serves likewise to manure other grounds, but is not the sort which is burned for lime, for that is of a dry nature. This, with its common surface or staple, brings good corn for some time, and good grass afterwards ; but the most common produce is beech and hornbeam. Of late many woods of this sort have been grubbed up in Berkshire, and thereabouts, and by the long growth of woods upon them, the ground has a good surface or staple, and has been very productive of corn, and are accounted their richest lands. But, as I have observed before, grounds of all kinds have plants which are natural to them, and therefore the farmers great business is to sort their plants to their ground which is natural to them, for that is a sure way of reaping a crop with little trouble and expence, for all the manures imaginable in such a case must be detrimental ; for without going far for a witness, we may venture to say, that the natural soil is always more agreeable to the health and prosperity of a plant, than any artificial soil we can make for it. So that besides what I shall say in the next chapter of the improvement of land by manures, I shall in another chapter speak of the improvement of land, by adapting the proper plants to every sort of soil ;

soil; for in my opinion there is no necessity of driving all our lands to corn, and forcing some of them by so great expence and trouble to bear it, that the farmers get little or nothing by them, seeing we have soils of all sorts that will bring some profitable plants of themselves without any manuring, and will bring in as much or more money as the best corn: And as it is the principal end of farming to get money, what matters it by what crop we have it, if we find it in our cabinets. Is a guinea ever the better or worse for being gain'd by corn, or the most vile thing one could name? But it is surely much the better as we get it by less trouble and expence, and that must be done by skill, which can only be had from experience.

THE grey clay is like the former, only differing in the colour, and a very little in its share of unctuous parts, this being less binding than the former.

THE yellow clay is very stiff, I mean by it such as is used by brewers; the parts of this are so binding, that after ploughing the clots should be broken with mattocks or beetles, or else 'tis impossible to make any thing of it; it is so slimy and binding, that it will hold any water like a basin: this notwithstanding may be rectified by lying fallow in the winter, for the rains, frosts, and

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and snows will have that effect upon it as will take away part of its binding quality, and then all means should be used to keep it from resolving again, as I shall set forth in my chapter of manures; for while it is in its primitive stiffness it is not fit for corn, and therefore will not be reckoned good among the farmers. And besides, while the great stiffness remains in it, the clumps or clods will be so large, and lie so hollow, that the ground will never close or settle; and without that is done, the roots of every thing that is planted in it must be subject to meet the air, and cannot be closely covered, which will occasion death, or make them canker; for no plant can grow well, unless the ground it grows in is of such a sort as will close and settle well about its roots; nor any seed will come up if the ground is not well settled about it. And besides, the more open the parts of any ground are, the deeper the impression will be that is made in it by the sun, rain, air and dews, and the greater share of fertility will it gain from them, and the greater share of riches can it dispence.

THIS sort of clay lies commonly in very deep beds; I have known a well sunk above an hundred foot before the workmen could find any other kind of soil, and in many places wells have been dug above fifty, before

fore they lost the clay, or found a spring, and that has generally been in a gravel, or a quicksand; so that those who seek for springs in such a soil must arm themselves with patience, for they must not think to meet with them on a sudden. This and the red clay are much the same one as the other, their colour seems only to make the distinction; but we may make one remark upon them, that all the parts of them which lie in the surface, or nearer to the air, are tenderer than what lie remote from it.

THE other clay which I am to mention, is the blue clay, which of all others is the most stubborn; for in this the viscous parts abound more than in all the rest; it cuts almost like glue, and is reckoned the most barren soil, by those who think no soil good that will not bear corn. But still this has its favourite plants, and is capable of being made tender as any of the former soils, by the same means as the former clays are to be ordered, only will require a little more labour. I have seen this soil by dint of labour and industry, brought to bear very good corn, but it may be ordered upon the foot I have said before concerning the improvement of lands, by cultivating such plants upon them as are agreeable to them. This clay then may bring profitable crops without much charge or trouble.

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THUS I have taken a view of the several sorts of soil common in England, and the ensuing chapter will shew the methods of manuring them.

AFTER what I have here said concerning the influence of the several elements upon plants, it may be expected that I should say something particularly of the manner by which these several elements operate upon the several parts of plants, but that will be the subject of another chapter.

C H A P.

C H A P. II.

Of Manures, &c.

HAVING in the former chapter given my reader an account of the several varieties of soils, waters, and of the influence of the air and sun; I shall in this discourse speak principally of the plough, and begin with some curious observations in the art of husbandry, which were written two hundred years ago, by master Fitz Harbarde, with my remarks upon them. That gentleman was the author of two small but judicious pieces, about the year 1500, one called *The Booke of Husbandry*, and the other *Surveyinge*, both which copies have by chance fallen into my hands, and contain very profitable matter relating to agriculture, and especially that of the first days in England, which ought by no means to be lost to the world. I shall introduce them occasionally in this work in their native dress, and compare them with the present practice. By way of introduction, Mr. Fitz Harbarde gives the farmers the following instructions, viz.

The mooste general llyvynge that husbandes can have, is by plowynge and sowynge of theyr corles: and reevynge or breadynge of theyr

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theſe cattel; and not the one without the other. Then is the plough the moſt neceſſarieſt inſtrument that an huſband can occupie: wherefore it is convenient to be knowne how a plough ſhould be made.

THIS introduction ſhews us the firſt rudiments of huſbandry that a farmer ought not only to be ſkilled in the improvement of his land, by ſowing of corn or ſeeds, but ought alſo to underſtand the breeding and the management of cattle; for every farmer is the richer, as he knows how to make the beſt uſe of every thing about his farm; and as there is no farm where cattle muſt not be employed, ſo it is neceſſary not only to know how to breed and raiſe them to the beſt advantage at the markets; but to have juſt ſo many of them and no more, as are neceſſary to live upon the farm, and of ſuch ſorts too, as will feed on the offalls or leavings of one another. But my author ſpeaks firſt concerning divers kinds of ploughs in his time. His own words are, There be plowes of dyvers makings, in divers countries, and in likewiſe there be plowes of prou, of dyvers ſaycons; and that is becauſe there be many maner of grounds and ſolle: ſome white clay, ſome red clay, ſome grabell, or chylturne, ſome ſand, ſome mean erth, ſome medle with marle, and in many places hygh ground, and one plough
wyl

wyl not serbe in al places ; therefore it is necessary to haue dyvers maner of plowes. In Somerssetshire about Zelcasser, the shar-beam, that in many places is called the ploughe-head, is four or five foot long, and it is broad and thyn, and that is because the land is very tough, and woud suck the plough into the erth, if the shar-beam were not long, brode, and thyn. In Kent they haue other maner of plowes : some go with wheles, as they do in many other places ; and some wyl turne the she-brede at every londs end, and plowe al one way. In Buckinghamshire are plowes made of another maner, and also other maner of plowe prongs, the which are seemeth generally good, and lykely to serbe in many places, and especially if the plough beam and shar-beam were four yntches longer, between the sheeth and the plowetayle, that the she-labrede might come more aslope, for those plowes gyve out too sodenly, and therefore they be worse to draw, and for no cause els. In Lecestershyre, Lankeshyre, Worcheshyre, Lincolne, Norfolke, Cambridgeshyre, and many other countreies, the plowes be of dyvers makinges. But how so ever they be made, if they be well tempored and go well, they may be the better suffered.

THE use of these is to shew us in the first place, that so long ago as two hundred years

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years and upwards, we had diversities of ploughs in England ; and in the next place, there was then a regard to the easiness of the draught of the ploughs. It appears likewise by this article, that the farmers of those times, had so much regard to the difference of soils, that they appointed different sorts of ploughs for them ; but in the books of Hesiod, Virgil, Columella, Varro, Paladius, and others the ancient writers of husbandry, we find but two sorts of ploughs, mentioned, as I have observed in my survey of the ancient husbandry. So far have the moderns improved upon this useful instrument ; and I am persuaded when the true use of the plough and the knowledge of its several parts, come once to be well understood by those who are well skilled in mechanicks, we may still see greater improvements made in the contrivance of this engine, than has hitherto appeared ; for there are few farmers who have leisure enough and knowledge enough of the mechanick powers, to spare time or bring into practice any thing extraordinary on account of the plough ; but the gentlemen when they come to know the parts and use of ploughs, may perchance employ some of their time to give us something new and useful upon that head ; especially those who take delight in farming,
and

and hold grounds in their own hands. There are some indeed who are wise enough to judge, that the plough is not an instrument below the thoughts of the noblest personages ; and who have taken steps towards its improvement, as well knowing it is in a manner the key to husbandry. Among these gentlemen, I have received some instructions relating to it, but particularly from my worthy friend Matthew Bradbury, Esq; of Wicken-Hall in the County of Essex ; whose letter to me, with the draughts and descriptions of several new ploughs, I shall here oblige my reader with.

To Mr. BRADLEY, &c.

S I R,

ACCORDING to your desire, I have sent you the draughts of several ploughs, viz. of the double-breasted or trenching wheel-plough, of the single wheel-plough, the mole, wont, or ant-hill plough, and the paring plough ; all which by experience I have proved to be good in their several stations, and question not but will answer your expectation, and likewise re-
D dound

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dound to the future benefit of the publick.

I am, S I R,

Your most humble servant,

MAT. BRADBURY.

P. S. Sir, I have underwritten sent you an account of the several uses of my ploughs, and shall begin with the double-breasted wheel-plough, which with the middle coulter and six horses, will divide and plough a round ridge or fletch at one furrow, and will in twy-fallowing, and try-fallowing, plough nine acres as soon as a single dray-plough will plough one acre; but you must observe to set your wheels so far distant as to go in furrows on each side of the ridge.

THE same plough with three coulters, is very useful in drawing of ditches or trenches, where land lies wet and wants to be drained. But for this work of drawing of ditches, the plough will require twelve horses or more, according to the depth and stiffness of the land.

THIS plough will also draw wide and deep drains, and is a very useful instrument for cutting through rising grounds for avenues,

Fig. I.

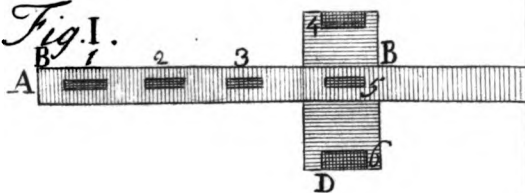


Fig. II.

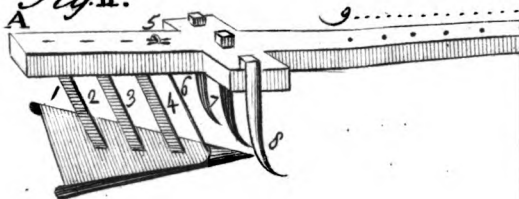
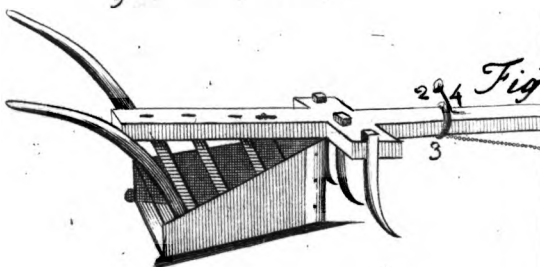
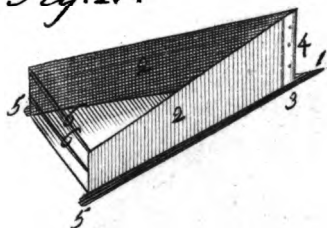


Fig. IV.



nues, which by digging would be very slow and expensive work; for where you can open one rod with a spade, which will cost three-pence, you may with this plough, draw and open near fifteen hundred rods in a day, if the ground be not too stiff.

I COME next to the description of the aforefaid plough, referring to plate the first.

Fig. I. FROM A to A is the plough-beam, ten or eleven foot long, and six inches square, from the tail end to the coulter, or a little beyond B B; and from thence to the nose, front, or little end of the beam C, must be hewen taper to four inches square. N^o 1, 2, 3, are the mortises four inches long, by two inches wide, for three standards or plough-sheaths.

D D ARE the two coulters blocks, of sound hard wood, eight inches each, from the beam to the out-side, seven inches deep, and about a foot long. These must be braced through the beam with two strong iron bolts, with keys and cotterals to keep the blocks immoveable.

N^o 4, 5, 6, ARE the three coulters holes, or places to fix the coulters in.

D 2

Fig. II.

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Fig. II. A view of the said plough, without the double breast, or mould-boards, in which may be seen the situation of the three standards, share-pin, or string, and the three coulter.

FROM A to A, the length of the beam.

N^o 1, 2, 3. THE three standards or sheaths, which are the strength of the plough, and hold the beam and the ground, or neck of the plough together: these are four inches broad, and two inches thick, one longer than the other, the longest to raise the bottom of the beam, from the upper side of the neck or ground, sixteen inches, as N^o 3.

N^o 4. THE shear-string or bolt of iron, to preserve the neck of the plough from wrenching.

N^o 5. THE key and iron collar or cotterel of the said bolt.

N^o 6, 7, 8. THE three large coulters or counters of well hardened iron. The coulters N^o 7, to go throw the plough-beam and the coulters N^o 6 and 8, to be fixed in the blocks by two iron-bolts, passing through the beam and middle coulters: as may be seen at the coulters N^o 8. So that when the three coulters are in, there will be four iron-bolts to keep the blocks and coulters immovable.

FROM

FROM 9 to 10, the pin-holes of the beam.

Fig. III. OF the neck or ground of the plough.

A, THE neck or ground of the plough made of solid plank of ash four inches thick.

FROM 1 to 2, must be eighteen inches wide, hewen taper to fit into the box or socket of the share.

N^o 3, 4, 5. THE mortise holes to receive the sheaths or standards.

N^o 6 and 7. THE cutting plates fixed with strong spikes to the verge at the bottom of the neck or ground of the plough. These must taper from four inches wide, beyond the ground, at the tail, to the corners of the socket of the share. These should be laid with the best steel, in order to keep in a capacity of cutting the work for the bottom of the plough.

N^o 8. THE the box or socket of the share nine inches long, four inches deep, six inches wide at the great end, and four at the little end.

N^o 9. THE neck and point of the share, seven inches long, and very strong and taper to the point.

D 3

Fig. IV.

Fig. IV. THE two breast or mold-boards, raised upon the share, and ground or neck of the plough, to open and turn the work.

N^o 1. THE share of the plough.

N^o 2, 2. THE two breasts or mold-boards, meeting on the middle of the share at 3.

N^o 4. THE rivet plate which braces the two mold-boards together, at the fore part, with three strong rivets, as appears in the figure. The height of this end of the mold-board, must be from the share to the bottom part of the plough-beam. To prevent the share and neck from rising, these mold-boards must be raised on the verge of the neck or ground, so as not to prevent the cutting plates 5, 5, from performing their work. These must be made of oak or ash sawn, two inches and half, or three inches thick.

N^o 6, 6. Two stattle pins to strengthen and keep the mold-boards asunder, at tail : see the figure.

Fig. V. A view of the double breasted, or trenching-plough, with all its parts.

N^o 1, 1. THE handles of the plough, or stilt : these are fastned to the ground of the plough within-side of the mold-boards,

The

The rest of the plough to N° 2, has been described in the former figures.

N° 3. THE draught collar, which leads by a chain to the bolster or plough-pillow, by which the cattle draw the plough.

N° 4. THE plough hammer with three fetts, which fet the draught collar forward or backward, by changing it into the several holes in the beam, and thereby make the plough go deeper or fleeter at discretion.

N° 5, Is the bolster or plough-pillow, which is a strong plank of three inches thick, and eighteen inches wide, through which is a mortise for the chain to pass, and fixed thereto with a collar-wedge.

N° 6. THE round collar and jumping links, which fix and hold the plough to the bolster ; and also raise and bring in the wheels at the lands end, or turning at discretion.

N° 7. THE pin which goes through the collar into any of the holes of the bolster, to set the plough offward or toward, as the work requires.

IN the front or fore part of the bolster, which cannot be observed in this figure, are fixed the cloves, or tongues, or cheeks of wood, and rackfillary of iron, with eight notches, by which the cattle draw the plow and set the wheels to go at a true distance and

D 4 prevent

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prevent the plough's overthrowing. This is the strongest plough that ever was made, and will endure twenty horses : it does well in any lands, but especially in light grounds,

Plate II. Fig. 3. Of the fingle wheel-plough.

THE next plough which I shall take notice of, is the fingle wheel-plough, made according to the figure, which somewhat resembles the common dray-plough, and is chiefly used for plowing and tilling your stiff lands, which a common dray-plough has not strength to perform. This plough, contrary to the gate of the dray-plough, is forced deeper into the ground, by the holder's leaning or weighing thereon, as occasion requires, which on the contrary takes the dray-plough out of the ground.

THIS fingle wheel-plough, performs its work with more certainty and truth, than the dray-plough, and will till such clays and gravelly soil, where the dray-plough cannot penetrate ; and will air, or open, and plow your land, to what depth or certainty you please ; especially upon your high baulks, or backs, and broad lands, where they are most commonly in use, and are sometimes drawn by eight or ten horses or oxen, in hard work, or as many as necessity

Fig. I.

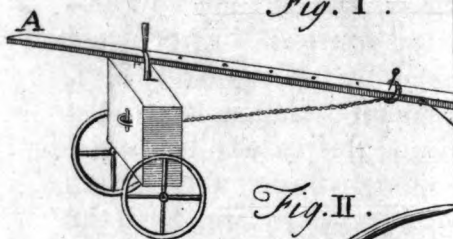


Fig. II.

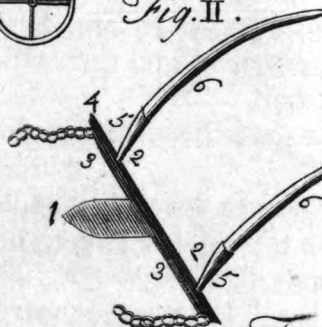


Fig.

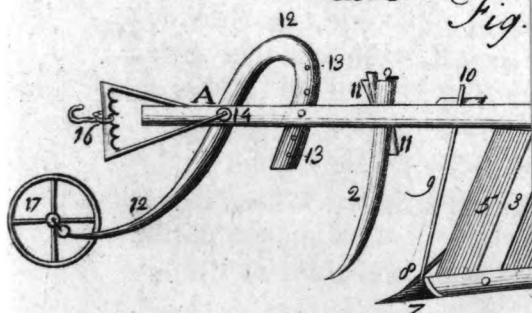
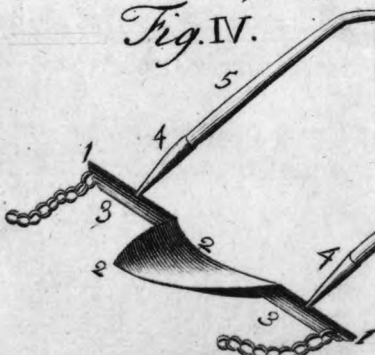


Fig. IV.



cessity requires, These ploughs are very proper and useful for drawing water furrows in wet lands, which they will readily do, twelve or fourteen inches deep, which is performed by raising the Wheel, which wheel upon all occasions, lets the plow into the ground deeper at discretion.

A, A, Is the plough-beam, about seven foot long, and five inches square, from the tail 1, to the coulter 2, and then taper to three inches and half.

N^o 3, 3. THE two standards or plough-sheaths.

N^o 4. THE stilt or plough handle set sloping in at the top of the beam, behind the sheath or standard.

N^o 5. THE breast, or mold-board, or shield-board, or shield-brede, or furrow-board, or earth-board, which in the fore-part, must touch the bottom of the beam, to prevent the share or neck from rising.

N^o 6, Is the neck or share-beam.

N^o 7. THE plough-share, whose socket must be seven inches long, three deep, five wide at the great end, and three at the little end.

N^o 8. THE cock or coke of the plough to defend the mold-board, and cut the work.

N^o 9. Is the string or share-bolt.

N^o 10. Is the collar and key of the same.

N^o 2

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N^o 2, 2. IS the coulter or counter of the plough.

N^o 11, 11. ARE the wedges whereby the coulter is set forward or backward, or offward, or toward. The upper wedges are called the fore wedges, and the wedge below the beam is called the hole, or heel-wedge.

N^o 12, 12. THE double check or iron frame for the wheel to move in.

N^o 13, 13. THE holes for raising or sinking the wheel higher or lower, thereby to set the plough deeper or fleeter, which you may do to an inch.

N^o 14. THE bolt pin, which, with its key and collar, holds the check or wheel-frame, and fillery, to the plough-beam.

N^o 15. IS the fillery, and its notches to set the plough offward or toward.

N^o 16. THE hook and ring to draw the plough by.

N^o 17. THE ring of this wheel to be of iron, about two inches broad.

Plate II. Fig. 1. Of the paring or fward-plough.

THE next plough which I shall present to your view, is the fwarth or fward, or paring-plough with wheels, which is chiefly for two uses. viz.

FIRST

OF HUSBANDRY. 43

FIRST, for the paring, cutting, or drawing of sword plates, or turfs for laying of grafs plats, or grafs walks in gardens.

SECONDLY, they are of excellent use for paring of poor lay grounds, and worn out sword lands, in order for burning, or devonshireing, and thereby improve the same for corn. This plough will raise more turfe in one day, with four horses, than twenty men can do with turfing irons, and to what centre or depth you please. This plough may be made as wide or narrow as you think fit, according to the tendernefs or stiffness of the soil; by which you must always be guided. This plough likewise may be set deeper or fleetier at discretion, by setting the wheels forward or backward, by the pin and collar, described in the figure, according to the holes in the beam, which must not be above two inches assunder, by reason your work is fleet or shallow.

WITH this plough, you may with great expedition, plough up weeds or thistles, in such lands as are open and tender.

The description of this paring-plough, is as follows :

FROM A to A, is the plough-beam, about seven foot long, which is mortised and pinnioned into the block.

B. THE block of solid, clean timber, without knots, CC,

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C, C. THE sheaths or standards, made flat on the inside, to close equally with the paring-plate, and to be fastened to it with two bolts and keys on each side, as is marked at D.

E. Is the paring plate of iron laid with steel about four inches wide, and twelve, fourteen, sixteen or eighteen inches broad, as occasion serves. This plate must be made to cut on the sides, which are bolted to the standards, as well as the bottom part.

F, F. THE two iron braces to support the standards from giving way. Note, the two standards must be mortised near the out-sides, and threw the block.

G, G. THE plough-handles or stilts of the plough, which must be fixed in the interstices between the beam and the standards slope-wise.

THE other part of this plough, with regard to the wheels, pillow or bolster, and collar links, is the same as I have described in the double-breasted plough, or may be observed in the Hertfordshire wheel plough, only the pin-holes in the plough-beam ought not to be above two inches asunder.

Fig.

Fig. II. Plate II. OF the flat-spade molehill-plough, or plough for cleaning of pastures. The explanation.

THIS plough is used in some parts of Essex and Suffolk for cutting of mole-hills, wont-hills and ant-hills, and will do as much of that work in one day, as a man with a spade can do in twenty days: It may be drawn with one horse or two horses lengthways, and might be of some benefit in teaching horses to draw; because, however the mole or ant-hills will afford a good resistance to this plough, yet there are none of them so stubborn, but the plough will cut its way through them, which will give encouragement to a horse; whereas a dead draught is the contrary.

Fig. IV. N^o 1. THE spade or tongue of this plough, which is a plate of iron about sixteen inches long, a foot wide, and about half an inch thick in the middle, or strongest part, and made very sharp on the edges. This must be rivetted with four strong rivetts on the upper side of the pareing plate 2, 2, which must be of iron likewise, well hardened and made sharp at the edge at 3, 3, this plate should be five inches broad, and an inch thick at the back, and four foot in length from 4, 4.

1

N^o 5,

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N^o 5, 5. THE sockets of iron, in which are fixed the plough stils or handles marked 6, 6.

N^o 4, 4. Is a foot-link and chain to set the harness on, for the horse or horses to draw by.

WHEN the work with this plough is over, the mole-hills, &c. may either be broken and spread upon the land, or carried upon stiff lands chiefly for their improvement, tho' it will do well upon any grounds: For the mole in the first place, and the ant in the next place renders it extreamly fine, and by raising the earth thus in the figure of an hill, the rains wash away all the viscous or slimy parts which were at first in it, if it were naturally stiff, and prevent its binding for the future, so that such earth is even coveted by the florists for its excellent goodness; and besides we may observe, that these hills are never annoyed with stones, for the mole never works but where it can have a free passage, and besides cannot raise a stone out of the ground; and it is not to be conceived that the ants can bring any there, or indeed would suffer any to be in the hills they inhabit; so that the sharp edges of this mole-hill plough are not in danger of being spoiled by cutting up of the hills. It is to be noted that this work should be done in the winter, the better to destroy the ants,
and

and also that being a proper time to lay manure upon land: But as this plough leaves the places bare where the mole-hills stood, it is necessary the February following to sow those places with Hay-seeds, which will in a short time come up, and in a summer be as good grass as the rest.

Description of Col. Bradbury's scalloped mole-hill plough. Plate II. Fig. 4.

THE use of this scalloped mole-hill, or ant-hill plough is the same as the former, only for the better destroying of the ants, the spade part of this plough is made hollow, somewhat like a scoop, as is represented in the figure; the use of which is to leave a hollowness in the ground when the ant-hill is cut off, which hollow place or basin will receive the rain as it falls, and drown the ants.

FROM N° 1, to 1, is an iron plate about five inches over, and above an inch thick at the back.

N° 2, 2, Is the scalloped spade, or tongue of the plough, which is an iron plate about 16 inches long, and about a foot over at the widest part; this from the sharp point is thicker by degrees till it comes to the back, which should be completely an inch thick. This iron must be well hardened, and very sharp on the edges,

N° 3,

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N^o 3, 3. THE paring plate, which should be very sharp on the fore edge; this should, together with the scalloped spade, be four foot from N^o 1, to 1.

N^o 4, 4. THE iron sockets, in which are fixed the plough-handles, or plough-stilts, marked 5, 5.

N^o 1, 1. Is a foot-link to set the harness on for a horse, or two horses to draw by.

N. B. WHEN this plough is used, the point of the scalloped spade must be set to the bottom of the hill, by raising the plough stilts, so that it may go into the ground; and when the hill is near cut through, then by weighing a little upon the stilts, the point rises again out of the ground. This work should be done in the winter, for then is the time to destroy the ants.

THUS we have set forth some of the most useful and curious ploughs, from a gentleman who is well known to be famous in the art of husbandry; and I hope will be an encouragement to others to follow his example, in communicating what may tend to publick good.

As for common ploughs, we may find them in every farm, and it would be needless to describe them: But it is necessary, however, to say something concerning the use of ploughs in general. The plough we are to consider, is an instrument designed for the

the breaking and opening of the ground, in order for the sowing of corn, or other seeds, or for planting of roots; but as we have grounds or soils of various kinds, and also as it is convenient to plough sometimes very deep, and other times to plow very fleet or shallow; so will not one sort of plough do every sort of work, but the plough must be adapted to the soil and work we may have occasion for. And in this case, that plough is esteemed the best which will dispatch the most work in a day, and render the earth the most fine and tender; for the opening of stiff soil, so as to make it fine and work well, is as profitable as dung; and I judge that the twy and try fallowing of land is chiefly helpful to the grain that is sowed upon it, by being rendered more open in its parts, and not only by lying a season without cropping: For we find about the West of England, that land, when it is cross-plowed, presently after the first ploughing, is by being opened and well broken, made capable of producing a plentiful crop without lying fallow at all; and from frequent experiments I find, that by changing of crops, a piece of ground need never lie idle: For tho' a crop of corn will draw much nourishment from ground, yet that will not draw out that nourishment which is proper for a Turnip, or a Pea, or a Bean, or

E a Car-

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a Carrot, or a parsnip, or a potatoe; nor do any of these singly impoverish the ground for any of the others, but every one draws a separate kind of food from the earth; so that were we to sow of all these sorts to follow one another, the ground would give us them in good prosperity. But we are to consider too, that by plowing the ground every time we change these crops, the earth has an opportunity of recovering its vigour from the air, and by repeated plowings from fortnight to fortnight, an exhausted earth will so regain its lost strength, that it will have no occasion for manuring. As a proof of this, I have dried earths so much, that there has not been any apparent moisture left in them, and have then put seeds into them, and enclosed them in dry jars, stopped as close as possible: These earths, tho' they were kept in a warm room for three or four months, did not at all dispose any of the seeds to chip or sprout; but when they had been exposed to the air for a month, they came up without any water. So we have many instances in Essex, and other places, of earth which has been taken a hundred foot deep out of the ground, where mustard has come up; from whence we learn how necessary it is for ground to be broken and exposed to the air, to put seeds in action, or make them germinate; for we
are

are well assured the mustard-seeds were already in that earth: Also we may see by the foresaid experiment, that earth divested of all its qualities, may recover them again from the air. So I have also been informed by a person of honour, that copper oar, after it has been drawn or refined, so that the pure metal has been out of it, the said oar has been laid in a high-way to mend the road; and after a year or two it has been worked over again, and produced a large quantity of metal, which, in my opinion, it could only gain from the air. So I say, that every earth by stirring, becomes richer than it was before; and the more the parts of stiff land are broken or opened, the more has that earth the power of receiving nourishment from the air, and of dispensing its riches to the seeds and plants that are put into it. Again, we are sure that the crops produced upon such soils, without the addition of dungs, will be found and wholesome; while on the contrary, where dung is used before it is perfectly mellowed and reduced to Earth, it is apt to yield a fly which will destroy a crop, or subject it to canker: so far is the saying true in husbandry, that the labour of the farmer enriches land more than dung.

THE plough we find is used for expedition, but the spade, when it is in the hands

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of an understanding man, will break and mellow the earth better than the plough, because every clod of earth may be chopped and broken with the spade at once, or the earth may be opened or dug to any depth; but then the spade work goes on slowly, and but little of it can be done in a day. Is it not then reasonable to judge that strong land, by being ploughed two or three times cross and athwart, may be rendered more fertile by being broken into smaller parts? for it is certainly so in those lands that are not dug with the spade.

THERE is one thing likewise which we ought to observe in ploughing, which is to break the ground at every time of a different depth, and that may be partly directed by the several crops which we design to put into the ground, that is by the shallow or deep growing of the roots.

IF we are to sow crops which do not take root above three inches deep, our plough need go but little deeper, and the turning of the ground for the next crop may be still deeper to eight or nine inches, and the third ploughing either between these or three inches deeper; and so at every turning of the ground you will have a mixture of such earth to help the fertility of the rest.

IT is advisable in ploughing of stiff lands not to plough them when they are over wet,
nor

nor yet when they are very dry; for the first will make them poachey, and the other will be over laborious for the horses; besides, ploughing when the ground is dry will raise the earth in large clods, which by being exposed to the sun, will bake to that hardness, that when the rains fall, they will not easily receive any benefit from them. In this case it is practised to break the clods with mattocks and beetles, and though it is somewhat expensive, is of good service to stiff lands, by rendering them fine, and thereby making them capable of receiving benefit from the air and dews. But in the ploughing of light lands, and especially such as are very sandy, it is best to do that work after rain, for then the soil will hold together, and the bottom may be clean turned to the top; but if sandy land is dry, the soil is so fine and open, that the ground ploughs unequally; the top and bottom mix together; so that in effect 'tis but half ploughed.

As for any directions concerning the breaking up of fresh lands, or laying up of ridges, or fallowing, and such like; every ploughman is sufficiently acquainted with that work, so that it will be needless to say any thing upon that head.

Mr. Fitz Herbarde tells us, that great skill is required in setting of all the sorts of a plough in a right order before we begin to

E 3 plough,

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plough, that the plough may turn clean and leave no rest-balkes. A rest-balk is where the plough biteth at the point of the coulter and share, and cutteth not the ground clean to the furrow that was last ploughed, but leaveth a ridge between, which is apt to breed thistles and other weeds.

THE same author goes on in an enquiry, whether it is better to plough with horses or oxen.

It is to be known, says Mr. F. Herbarde, whether is better, a plough of horses, or of oxen, and therein me seemeth ought to be made a distinction: For in some places an ox-plough is better than a horse-plough, and in other places a horse-plough is best; that is to say, in every place where the husband hath several pastures to put his oxen in when they come from their work, there is the ox-plough the best. An ox may not endure his work to labour all day, and then be put in a common, or before the herdsman, and after that be put in a stall all night without meat, and go to his labour in the morning, but let him be put in a good pasture all night, and he will labour much the next day; and oxen will plough in tough clay and on hilly ground, much better than horses. But where there is no several pastures, there the horse-plough is better; for horses may be teddered or tied upon lays, baulks, or head-lands, where

where oxen may not be suffered to feed, for they do not well if they are teddered; and horses will go farther than oxen on even ground, or light ground, and quicker in carriages; but they be far more costly to keep in winter, for they must have both hay and corn to eat, and straw for litter, and must be well shod on all four feet; and the geer (or harness) that they shall draw with is more costly than for the oxen, and shorter while it will last; and the oxen will eat only straw and a little hay, which will not amount to half the cost that horses must have. And if any forance (harm) come to the horse, that he wax blind, or lame, or old, he will be of little worth; but if any forance come to an ox, or he wax old or blind, he may be fed for man's meat, and be as good as ever he was, and the horse when he dieth is but carrion; and therefore me seemeth, all things considered, the plough of oxen is much more profitable than the plough of horses. What Mr. Fitz Herbarde here observes, I think it very worthy our notice. For in Somersetshire, Devonshire, and other parts of the West of England, the farmers make great advantage of their worn oxen when they have done labour, by feeding them in fresh pastures they bring them to be good meat, and sell them well in the markets. The chief objection

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made against the flesh of these cattle is, that it is of a large grain, and does not eat so short and tender as that of cattle, which have not been used to draw ; but when this happens, it is because either the draught cattle have been of that kind, which naturally were of a large coarse sort, or else that they have had but an indifferent pasture to feed upon, or have not had time enough in it, or else have not been shifted often enough from one pasture to another ; but where the oxen are of a good sort, and have been turned into good deep pasture, and changed from one to another discreetly, the flesh will be very tender and sweet, and is mightily admired ; but more of this in the discourse of grazing. Colonel Bradbury, the gentleman above-mentioned, tells me, in discoursing on this subject, that in such lands where oxen can work, it is necessary to have more than one draught of oxen, and to work them alternately, so that each draught may rest one day, and work another ; but that by no means oxen should plough in wet weather, or while their geer or harness is wet, for fear of galling. However it is certain, that when an ox first begins to work, his rison will be apt to gall ; but that being once well cured it will become hard as horn. Thus far concerning ploughs, I shall now proceed to treat of manures for land.

C H A P,

C H A P. III.

Of manuring such lands as are esteemed barren or unprofitable.

ALL soils, as I have observed in the first chapter of this work, are distinguished from one another, after the following manner, viz.

LIGHT or heavy, cold or hot, deep or shallow, wet or dry ; and when we have gone thus far, there is no other distinction can be made, for every soil is comprehended under one or other of these terms. All that are called light soils, are such as beginning at the finest sands, proceed gradually through the courser sands, and gravelly, or stoney, to the loamy.

ALL the heavy lands begin at the least loamy, or binding, and proceed through all the fat marles, the yellow clays, white clays, dark clays, to the blue clay.

ALL these are either cold or hot, according as they are situated, either in places remote, or shaded from the sun, or are more exposed to the sun on the sides of hills ; or else they are esteemed cold, by being annoyed with springs of water, or hot where they want water,

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A SOIL is esteemed deep or shallow, as the surface or staple, or upper stratum, is of more or less substance or depth. We have some lands, which from the surface downwards, are good, and of one sort above a yard deep, while we have others, that have not a staple of above two or three inches deep: these are said to be shallow.

THESE things considered, we are next to set forth what conveniencies or inconveniencies attend every one of these soils.

IN the first place all light soils are apt to bring their crops early, and the straw or haulm of the plants growing on them, very short; but their fruit or seeds, in greater number, than the strong soils; for the moisture of these soils, is soon exhaled by the sun; and the nourishing quality, does not so much abound in these, as to render the plants growing on them, over luxuriant, and therefore it is that their fruit or seed is more in number than in strong lands, and in these too, the fruit or seed is more ripe and perfect, and apt to keep, because they consist of fewer watery parts, than those growing in stiff and heavy grounds. It is a maxim that too great richness of ground occasions too great luxuriance in plants, and that always is an enemy to bearing of fruit, or prolificity. These light grounds however, may be strengthened by manuring

ing them with some of the stiff soils in such a proportion, as to render them between sand and clay. So that the binding parts of the clay, may strengthen the sand, which for some things is too open and free of it self. Our authors who have directed certain numbers of loads of manures, to be laid upon an acre of land, I think have not spoke sufficiently to the purpose, and disagree very much in that affair, some prescribing forty loads, some fourscore, and some an hundred, and others many more, without regarding how thick such manure will lie upon the surface, or what proportion the manure will bear with the quantity of earth that is to be turned up by the plough: I shall therefore explain this as clearly as possible.

WE are to know that by a load is to be understood, the load of a cart, or to be measured in the solid, is a cube of three foot, or such a quantity of earth, or any other body, as when it is cut in the figure of a die, will measure three foot over on every side.

WE are in the next place to calculate that this cube is thirty six inches high, and that if we propose to cover our ground three inches thick with the said manure, a load will then only cover twelve yards square, and then a rod or pole, consisting of sixteen

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teen foot square, will take up a load and half to cover it three inches deep, and an whole acre, which contains one hundred and sixty rods, will require two hundred and forty loads, or thereabouts. But it must be remarked, that if our land, which we term light land, is not quite sand, but has naturally a share of binding soil mixed with it, then if our manure be very stiff clay, about two hundred loads will do; for as I said before, our business is to dispose the soil so as to be of a midling strength, neither over light nor over binding: the strict sand, as I observed above, too soon exhales its moisture and nourishing parts; and the stark clay has those nourishing parts too closely confined to distribute them to the roots of the plants.

WHEN I speak here of clays for manure, I would rather chuse the yellow, red, or white clay, than the blue clay, though that may be used after it has been plowed or dug, and after it has been dried in the sun, beaten or hacked to pieces, it may then be laid on a sharp sand or gravelly ground; and so on the contrary, any sharp sand, such as we have upon the sea shoar, or such as we find in drift ways, may be laid upon this; or for want of these, fine gravel will extremely improve this or other strong clay, if it be laid on to the purpose; and at the first ploughing to plough no deeper than three inches into

into the clay, and the next time to plough two or three inches more into the clay, which in a few ploughings, will become tolerable mellow, and may then be helped by about eight score bushels of lime, upon an acre, or in want of that, with as many loads of heathy ground, both which I have known to succeed extremely well.

ABOUT seven years since, one of my acquaintance had a large piece of heathy or ling ground, which he did not think would be worth his while to cultivate, believing it to be so barren in its nature, that nothing profitable would grow upon it, but this ground lying contiguous to a piece of strong clay, belonging to another gentleman, which was likewise deemed to be of no value, my advice was to them both, that they should manure the one with the other; and it was so agreed that they both employed their teams about it, the one carrying Heath ground upon the clay, and the other clay upon Heath ground; so that both were covered with each others soil: these were then ploughed, and sown with barley, which produced an extraordinary crop, but the piece of clay ground had clover sown with the barley, and was fed part of the winter, and the summer following brought two crops of extraordinary good hay; and the other I am informed has had as good wheat, as has
been

been known in that country ; and also produced good onions, turnips, and pease. This husbandry of improving stiff land with light land, is now much practised in Yorkshire, and turns to great profit, and was well known to the ancients, as Columella informs us, where he says that his uncle practised it with good success. It is to be noted that Heath or Ling, always grows upon sandy land, sometimes white sand, and sometimes black sand, which last is the most common ; and where Heaths have been of long standing, we shall find the earth for several foot deep, intermixed with small fibrous roots, which when they come to be stirred, and exposed to the air, will rot. I cannot help taking notice en passant, of an expression of a farmer, who stood by when I first proposed the above improvement to the gentlemen, he was so wedded to the way he was used to, that he could not help breaking out, with some passion, “ What d’ye think that barren
 “ heath will mend barren clay ? a pretty
 “ experiment indeed, to mend bad with
 “ worse : if you was to cover the grounds
 “ with dung, I should say something to it ;
 “ but he talks (meaning myself) as if he
 “ knew nothing of the matter ; sure I, that
 “ have been bred in a farm all my life,
 “ and my father and grandfather before me,
 “ ought to know a little better than to fol-
 “ low

“ low such directions as these : ” but however the gentlemen were resolved, and found their advantage in it.

WE have seen before that all light lands are to be strengthened with clays, or such binding soils as are most commodious to be had ; for if we were to put any sort of light or open soil upon that soil which is already light, we should have no benefit from it. Among other things, for the improvement of light lands, chalk is to be used, that is such chalk, or white clay, as is greasy or binding, or such as is slippery, or has a viscous matter in it. This however, should lie upon the land some time before it is ploughed in, for the air and the sun to open it and mellow it ; otherwise if it be ploughed in before that be done, it will lie in lumps, and never mix well with the light earth. This husbandry of chalk, is taken notice of by Julius Cæsar, in his commentaries.

THERE is another sort of chalk which is hard and dry, which some have laid upon their lands, to no purpose, having mistaken it for the other chalk, before-mentioned. This dry chalk is indeed proper to burn for lime, and is then, being calcined, fit for the improvement of stiff lands ; but as it is naturally dug out of the pit, is rather injurious to land than helpful, but lime will fall upon the first rain, and mellow the ground it is laid upon.

THE

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THE small oily or viscous kind of chalk abovementioned, is said to be good for broomy lands; the reason is, because those lands are generally gravelly or sandy, and it helps to bind them: but concerning the killing of broom, I shall speak in another place.

THIS soft chalk, if it is dug and let lie for a year or two in heaps or in pits, where water may come frequently to it, or lie constantly upon it, will be much bettered, and do much more service upon land, than if it was to be laid upon land fresh out of the pit. In Kent it has been much used, and now in Essex and other counties. Some farmers are so fond of it, that they hardly think their ground will produce any thing without it; nay, I know some landlords who will pay their tenants for the chalk they lay upon their lands, by giving them some years rent of their farms, on condition they lay a certain number of loads of chalk upon every acre. This I have observed has been practised, and now is practised with so little judgment in some places, that I cannot help pitying the persons who are engaged in it; for I find all chalks are alike to them, and all soils too, let them be of what sort soever, still they must be chalk'd, notwithstanding there are far better manures in the very farms which are thus disposed, and perhaps
every

every load of chalk is brought seven or eight miles.

CHALK, when it has been well tempered by the air, is said to sweeten pasture grounds, which it does by rendering the sward or sward more fine; but I do not approve of it, since every one knows how much a good deep grass is to be coveted for feeding of cattle, and besides, there are other ways of mending of sower grass grounds, as I shall mention by and by.

I SHOULD here speak of lime, as being most commonly the product of chalk; but I shall chuse to defer it till I speak of stiff soils.

THE next manure for light lands is marle, which is of various kinds, viz. The grey marle, blue marle, yellow marle, red marle, so called in Suffex, peat marle, pit marle, steel marle, clay marle, cow sheet marle, and flock marle, which are the stiffer sorts of marle, and the most proper for assisting our light lands. The characteristics of marle are, first, that it is a soil fat and unctuous, almost of the consistence of clay, but will, when it is exposed to the air, crack and fall to pieces in square and angular bits, which by frequent ploughings will still break less and less, and incorporate with the light lands, and by binding them will very much enrich them.

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THERE are also some other sorts of marle which are yet more light, and have fewer unctuous parts, which by being burned, and spread upon stiff lands, greatly improve them; however, any of these marles, if they are distributed discreetly upon land, either for corn, or upon slender pastures of fine short grass, greatly enrich them.

THERE is another good improvement for light lands, which is the scouring of ditches and ponds where the soil is clay or chalky; but this should lie to be dry, if it can conveniently, before it be laid on to any grass; and the principal season of doing this work is in September, about the beginning of the month, for then the grass will have time to get above it before winter. This is practised by the cow-men near London, and they have the richest winter pasture or rowen in England; but they have this regard to the nature of the land when they thus manure it, that if their pastures are stiff land, such as clay, brick, earth, &c. they cover them with cow-dung; but if they are light lands, or gravelly, then they cover them with the scouring of ponds or ditches.

NOTE, where clay, or any sort of stiff soil can be found, by digging in any of the light lands, tho' of a very considerable depth, it is worth the landlord or farmer's while to have it opened for the benefit of
his

his land; or if there can be no such found by boring, or otherways, then it is necessary to join with some neighbour that has such stiff land, that by changing one with another, both estates may be improved by one another.

I COME now to speak of stiff lands, the worst of which is that which is called blue clay, which is judged to be fit for nothing; it is looked upon to be as bad as malm, which is so tough and sower, that a learned author in this way affirms it cannot be made productive by any means; but both these, however, are to be brought to reason, and rendered profitable, if we use the following methods, which I find were unknown to him. In the first place where we meet with these soils, it is almost constant to find them incumbered with water, and that must be first drained from them by furrows, and then take off the surface about four inches deep, and as soon as it is dry, make small faggots of heath or furze, and make heaps of this about three bushels in each heap, and lay a faggot under every one: Let these heaps stand about four or five foot asunder in lines, and the lines about eight foot from each other; then burn them, and lay on as many bushels of sharp drift sand, or sea sand, as there are heaps of burnt earth, and spread all as equally as may be over the piece; then

F 2

plough

plough the whole about two, or at most three inches into the clay, and a month after cross plow it, then let it lie all the winter, and the spring following sow it with horse-beans, and as soon as they are off, give it a covering of horse dung, or litter well rotted; or if you have any heath, ling, or sandy band, near you, use that instead of dung, and plough it to lye the winter; and the spring following you may sow it with rye, grass, and clover-seed, if you have a mind to lay it down for grass, or it will bear good barley, or oats, or pease. This has been practised about Staffordshire; and I have ordered some of the same kind of ground, after the same manner, in a piece of land which I made into a garden; only instead of horse-beans, I planted it with the early spanish-bean, and burnt the haulm upon it.

IN some places where this is practised, if cole-pits are near at hand, the waste cole which is heaped near the sides of the pits, is used to burn with the earth, and then the sharp drift sand, or sea sand, need not be laid on; for the cole-ashes are as sharp as the roughest sand, and contribute as much to open the clay as the sand would do.

WHERE large woods are at hand, the surface of the land in such woods is excellent to mix with the burnt parts of this hea-

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vy foil ; for it consists chiefly of rotted wood and rotted leaves, which are very light and abound in vegetative powers. It is to be remarked that in the manuring of clays or stiff soils, it is necessary to do it at once to the purpose, for the oiley or viscous parts, which occasion the clay to bind, will else soon overcome and swallow up our manure, if it be laid on in small quantities, as I have often found ; so that though the expence be pretty great at first, yet seeing it is done for ever, it is the cheapest way : the grounds that are marled, or chalked, or dunged, or limed, as they ought to be, come to more money than the above prescribed method ; but if they are not manured well at once, there is no end of the expence, and you have but indifferent crops into the bargain.

THE yellow clay and white clays, are to be manured in like manner as the former, provided we find them as stiff ; but if they are more tender and easy to work, and are not what is called fower, then burning or devenshiring, or devonshireing, should be avoided : the chief manures for them are lime, dung, sand, both the soft and the sharp, as well out of rivers, as drift places in high-ways, as from the sea-shores, coleshes, the cleaning of streets in great cities, heath ground, ashes of heath burned, seaweeds burnt, wood ashes, rotted wood and

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rotted leaves, malt-duft, linfeed cakes, after the oil is preffed out, foot, brokes, or fern rotted ; and all forts of weeds rotted or burnt, peat or turfe broken to pieces, the black earth taken out of boggs or fens, charcole-duft, woolen raggs, chopped fmall : and in a word, every thing that is light and open in its parts, is a proper manure for stiff foils.

BUT I fhall treat of every one of thefe fingly, and in their order, beginning firft with lime.

LIME is made by burning of chalk, marble, fhells, or any other body that will calcine. The nature of lime, is to ferment violently, equal to fire, immediately upon the approach of water. This ferment, however the parts of the lime were united before, now divides and opens them that every lump falls to pieces, and then the ferment ceafes ; and when this is over, they have no more heat in them, fo that they may even be received into the ftomach, and are often ufed to correct the acidity of the ftomach. Thefe too are judged to be good for correcting the fowernefs of fome lands, chiefly thofe that are binding ; and befides, as lime is flackened always upon the ground, we manure with it ; fo while it is under that operation of fermenting or firing, the earth where it lies, muft neceffarily be affected by

by it ; and some of its acid vapours be put in motion, and exhaled ; and after the fire is over, there remain the fine parts to mix with the soil of the field.

It follows next that I speak of such dungs as are profitable to land, that is, for stiff land ; for there is no greater enemy to light land than dung ; for all dungs consist of fine parts, which when they have lain a sufficient time to mature, so as to be reduced to meer earth, become more light and open in their parts, than the lightest natural earth in the world ; and by experience I find that no kind of dung ought to be used till it is like earth it self ; for in all trials I have made with dungs, in their several states before they were thoroughly reduced to earth, I found that they bred flies or destructive insects, which eat up or cankered the crops that were sown, where they were used ; and the same is observable in all gardens where much dung is used ; for our gardeners, provided they have dung for their gardens, do not stand upon the age of it, or whether it is thoroughly matured, but use it indifferently as it comes to them, even sometimes while it is hot or under fermentation, they bury it or dig it in, for the improvement of their land ; and are as surely attended with the fly which invades and destroys their crops. So likewise the farmer should as carefully

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avoid the use of fresh stable dung, as the gardner, for crops, whether they are in the field or in the garden, are liable to the same hazards, if they are treated after the same method. There is one use indeed for new dung from the stable, which is the heat which it produces by its fermentation ; this is applied to force, or forward tender plants in their growth, and to bring them before their natural season by making hot beds of it ; but after the fermentation or heat is over, it becomes colder than the earth it self, and so remains as long as it has any moisture in it ; and at length becomes a fine light earth, fit for use.

THE farmers do not seem to lay any great stress upon the salts that are in horse dung, more than what are in common straw ; for we find that the common practise is to lay straw in high-ways and wet places, to rot, and then use that as they do dung from the stable, with a success which they account equal : but sure it is that the parts of animals are of great service to the growth and luxuriance of vegetables, as I have instanced in many places of my works ; the laying of dead dogs, cats, the inwards of sheep, blood, and such like, to the roots of trees, is known to every one to help them in a very extraordinary manner ; and to some plants urine is said to be helpful, but chiefly

chiefly to the vine, but then the vine must be old, for I have tried it, and had almost destroyed some young vines with it, but the old vines shot something earlier than ordinary, which perhaps was occasioned by the urine.

HOWEVER the rotting of straw, according to the farmers method, I hold to be very good, especially for corn lands, because the rotted straw, containing parts which are of the same nature as corn, must reasonably assist corn. The dung from a stable, consists likewise chiefly of straw; and the small quantity of real dung, which is in it, is no more than corn and hay macerated and ground to pieces with a small matter of the animal juice, mixed with it, may also be agreeable to land for its better production of plants; but then, as I observe above, this is apt to breed insects while it is fresh, and must not be used till it is quite rotted, and then its lightness will assist in opening the too binding quality of the stiff soils.

THE dungs besides, that are used as proper for stiff soils, are, besides the dung of horses, the dung of asses, and of mules, where those beasts are in plenty. These I find are much of the same nature, for their food is of the same kind; though the strength of the ass and the mule, is superiour to the horse, yet I cannot be of the opinion of
many

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many men, that the dung of these animals is stronger than that of horses ; for as their food is all one, I rather judge that the stronger animals, have a stronger digestive faculty, and therefore their excrement must be weaker.

NEXT to the dung of horses, asses, and mules, the dung of kine, such as cows and oxen, is preferred by some farmers, because when it is dry it breaks into very fine parts, and helps to lighten stiff soils. The farmers judge this to be more proper to lay on pasture or meadow land, than upon corn land ; for the food of cows being chiefly herbs, and not of any solid grain, it is not thought to contain so much strength in it, or so many salts, according to the common phrase, as the dung of those animals which feed upon corn or other grain. This sort of dung is also doubly ground or macerated, as is all that of animals, which chew the cud ; but as this kind of cattle feeds upon much ranker grass and herbs, than sheep (which also chew the cud) the dung of kine is thought to consist of more watery parts, and consequently is accounted less nourishing than that of sheep ; however, as grass is chiefly the food of kine, so their dung is so much the more proper for grass, as the herbsmen about London experience every year ; and as corn is graminous,

minous, or of the grassy kind, so the dung of kine cannot be disagreeable to corn, altho' it may not make the corn grow so rank as horse-dung; and though many farmers are not for laying cow-dung upon land for corn, yet I have known others who have laid it upon their corn land, and have received good profit from it. There are some sorts of manure, however, which will help some plants, and destroy others, such are brines. Mr. Trowell of the Temple, a gentleman of great knowledge and veracity, shewed me a field of his that had been very much incumbered with mallows, and after trying many ways of destroying them, to no purpose, he at length got a large quantity of brine, wherein beef had been salted, and poured it upon them, and some of the grass likewise, which was near them: the consequence was, that he killed the mallows, but the grass grew very well.

THE dung of sheep is accounted very good for strong or stiff lands for corn; but it is thought if when sheep were folded upon land, the shepherd or some other person, was immediately upon changing the fold to turn the dung into the ground, or to raise the ground with an hough, it would make the ground richer; for they think the sheeps dung, by drying, will loose much of its virtue: but be that as it will, were are sure that

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that there is some good in the urine of the sheep, which soaks into the ground ; and unless the dung will divide sooner when it is in the ground than when it is above ground, I cannot understand how ground can be helped that way : I should rather think that by the dung's lying exposed to the sun, the salts, if there are any in it, would be sooner fixed, and it would be as useful, if not more serviceable to the land, if it had lost its foetid quality, before it came to be plowed in.

IN France and Flanders, and other parts of the Continent, it is the custom to house their sheep every night, to save them from the wolves. There the method is to strew the floor thick, with fresh sand every day, for the sheep to lye upon, till at length the sheep-house is so full that they remove it all to an heap without doors, and begin again to strew the floor afresh with sand, or light earth, and so continue the same work every day, till the house is full as before ; and in twelve months time, they raise a large stock of this manure, mixed with the dung and urine of the sheep, and carry this upon their heavy lands, which bring very good crops of corn ; and this I think is much the best way of improving lands by sheep's dung, but it is only profitable for stiff grounds, it is the ruin of light dry lands,

lands, as I find by experience from many observations.

To this we may add, that deer's dung has been said to be of good use to improve land, being collected in such places where deer are fed in the winter: the quality of this is like that of sheep.

IN the use of this sort of dung, as well as sheeps dung, we should not cover our land by the load, but by the bushel, as you do with lime, that is from one hundred bushels, to one hundred and sixty bushels to an acre; and with it, if the ground be very stiff, lay on upon the same acre about one hundred loads of sharp sand, or such other soil, as will open the parts of the clay.

Hogs dung is what I shall take notice of as a kind of manure which is accounted very profitable for land, the food of the hog being very strong and rich, the dung is likewise judged to be so. But especially this should be kept till it has lost its foetid smell; for all dungs as long as they retain an ill stench, entice insects to breed in them, which prove destructive to crops, if such dung is laid on and ploughed into the ground before it be perfectly purified. This indeed, before it has had due time to mature, is charged with a viscous quality, which some think will help to bind the sandy or light grounds, but that quality is soon lost, and the

the light lands are never the better ; for then it becomes as light as other dungs. The farmers allow just half as much of this as they do of horse-dung upon an acre of land. This being mixed with sand, and laid in heaps for a year or two, makes a very good compost.

HUMAN ordure is much used in Italy, and the South parts of France, for their vines, and orange, and citron-trees, and is sold there at a very dear rate ; it fertilizes land extremely, as I have also observed in England, but must not be used till it has lost its foetid quality. In those countries it is the way to keep this in pits (made on purpose,) to be of one year, two years, and three or four years old : that of four years they account the best, and that of three years tolerable, but the others not so fit for use. The persons concerned in these pits, have also a great regard from whence they have it, preferring that which they bring from places where the most flesh is eaten, as the strongest and richest manure of all others. I remember, when I was a boy, to have seen tobacco and cabbages growing upon a spot of ground where a large quantity of this dung had been buried two or three years before, that surprised all that saw them, for their extraordinary largeness of size ; and I remember a farmer in the road, near Acton in Middle-

Middlesex, who manured three or four acres of strong land with this sort of dung, which had lain several years in night-pits, near London, that brought him so great a crop of wheat, that he had most of his corn grow with two and three ears upon a stalk, which he never had before, and for three years he continued the same crop upon the same land, with great success. The land I think is now converted to a garden, for the serving of the London markets. We must consider at the same time we speak of this dung, we are not to forget that a great part of its richness may proceed from its mixture with urine; though Glanber supposes it to be destructive to vegetables, because of the salarmoniac-like quality in it: but this quality does not equally abound in human urine, even though from the same person; for it is more or less according to the diet and constitution of the person: however, as long as it has any foetid quality, I find it must not be used or applied to the roots of plants of the herb kind, for it will change them to a yellow colour, and has often killed them, as I have found experimentally, though distributed in very small quantity. But again I have known human urine, that when it has been thrown into a little pit constantly every day, for three or four years, some earth about two years afterwards was taken out of the

the pit and mixed with about twice as much other earth, to fill up an hollow place in a grafs-walk, and the turfe which was laid on it grew fo largely and vigorously, and fo much greener than the reft, that by the beft computation I could make, the grafs on that spot, in a month's time, contained above four times as much in quantity as another spot of the fame bignefs, though all the ground the grafs-walk was laid on, was very rich ground. So that urine, when it is well digefted and has loft its foetid quality, feems helpful to vegetation, efpecially when earth is impregnated with it. We are told that old urine is of extraordinary efficacy if it is applied to the roots of trees. And Columella, and other ancient writers, *de re Rustica*, highly commend the ufe of urine for the improvement of land; and Mr. Hartlib gives us an account of a woman near Canterbury, who ufed to fave all the human urine ſhe could get, and when ſhe had got a pail full, ſhe ſprinkled it on her meadow, which cauſed the grafs at firſt to look yellow, but after a little time grew wonderfully.

I HAVE obſerved that dungs, ſuch as that of ſheep, deer, pigeon, and hens, have been good helps to land when they have lain a long time in pits of water, and then the water taken out, and put in tubs, which being wheeled

wheeled on the land, and those lands sprinkled with the impregnated water, just before corn has been sown upon them. This method I have known to do good both upon light and heavy ground ; but then we are to observe that the light land must first be helped with laying strong soil upon it ; and on the contrary, the strong soil must be mended with laying light and open soil upon that. By this method you have the spirit of the dung equally distributed upon the land ; but by sowing of pigeons dung upon land, it will always be unequal : besides, in the way I mention, the fine parts of the dung will be found at the bottom of the pits, and may be laid upon the stiff lands, towards opening their parts. One reason why I insist so much upon the opening the parts of clay, and other stiff lands, is because such lands have a vast share of fertility in them, but by reason of their binding quality, which is occasioned by the viscous matter, which holds the parts together, I say these rich qualities are not at liberty to act, unless we can find some expedient to break the clay and destroy the slimy parts.

BUT as I have said, that the water where dungs have been infused, will take out its spirits or virtue ; so on the other hand, when we have liquors which are productive,

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such as urine, blood, and such others, it is best to temper them with earth in a pit, and when they have lain a sufficient time to digest and rectify, then to strew that earth as equally as possible upon land. The earth tempers and qualifies the too great violence of these liquids, as the water unites and resolves the scattered qualities of the dungs.

BESIDES the dungs I have already spoken of, there is the dung of pigeons, which is frequently in use among the farmers in the Isle of Ely: This is judged to be of good use in those low lands, to be sown upon the wheat; or as Mr. Hartlib would direct in his prescription for planting or setting of wheat, to put some of it into every hole where the wheat is set. But my opinion is, that this way is not so convenient for the improvement of corn, because it will be impossible that all sides of each corn can partake equally of the pigeon-dung, one side will be joining with the dung, and another with the natural earth; so that the nourishment of the seed is of two sorts, very different from one another, and dispenced to the grain in very different proportions. The dung of pigeons, however, is certainly very full of salt, and may be used with advantage upon land, if such salt can be equally distributed; and there is no other way of doing that, but by infusing the pigeon dung in a
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pit of water, stirring it now and then till the water is impregnated with its virtue; and then with a water-tub and barrow, to water the land with it, and the sediment being mixed with sand, or light earth, should also be spread upon the land, if it be stiff or heavy, in order to open and mellow it; for otherwise the bare manuring with pigeon's dung will at best assist it only for one crop.

THE dung of poultry is also in esteem among the farmers, and is used by them as pigeons dung, but this to be used simply, will give no better success than the pigeon's dung; the way which will be the most profitable, is to infuse it as I have directed for the pigeon's dung; but these are only like cordials, which are for the present a spur to nature, and afterwards leave it weaker than it was before. Keep this as a rule, open your stiff soils, and bind your light soils. These are all the sorts of dungs which are generally esteemed useful in farming, for the dung of water-fowls is supposed to be void of any nourishing quality. The ancient writers of husbandry tell us, that the dung of Geese and Ducks, &c. spoils the land, and that these kinds of fowls should not be suffered to go upon grass grounds, because their waded feet flat down the grass: But I find Mr. Mortimer gives us an account of his own knowledge, of a field, or common of grass,

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that has been much improved by them. And in the North of Essex a common yields very good grass, which the inhabitants say is much improved by the feeding of geese upon it : And I cannot see why it may not be so, seeing the food of geese is upon grass and herbs, and grain or corn, and that of ducks upon the same as the goose, and flesh besides, which surely must produce strong dung ; for as I have observed before, those animals which feed upon the strongest dyet, yield the strongest dung. The proportion of these dungs is about forty or fifty bushels to an acre.

I HAVE now done with dungs, and come in the next place to speak of sand, and its use in the improvement of stiff or heavy grounds, such as malm and clay.

SAND is of two sorts, viz. the soft sand, and the sharp sand. The soft sand is such as we find in bogs, and sometimes in hills, &c. consisting of round particles ; or is sometimes mixed with such parts as are the result of rotted leaves, rotted wood, or animals rotted or reduced to earth. Such a soil as this, I mean the sand with round particles simply, is deemed barren ; but still I find it will bear the Fir-tree, the Pine, the Pinafter, and the cedar of Libanon will also prosper there ; for about four years ago I sowed some of the seeds of the cedar of Liba-

Libanon, upon as barren a sand as can be supposed; that is, such as is put into hour-glasses; they came up, and are now in good prosperity, and I am of opinion, will continue to prosper as they have already done. There are also many other kinds of profitable plants which will grow upon the same soil, as I shall instance by and by; and when this happens to be well mixed with parts of vegetables, or animals rotted, as I have hinted before, it is then a soil more generally esteemed rich; either of these are good to lay upon heavy soils, especially if they are assisted with sand of a sharper nature.

THE sands which are sharp, are the sand taken out of the bottom of rivers, the drift-sand taken from the sides of high-ways, and sea-sand. All these are like the sand, which about London is called scowring sand, which should be laid upon very stiff land; about a load upon every rod of ground, and in smaller quantity upon such land as is more tending to lightness. The sand which is taken out of rivers is called by some suag-great, these have been experienced in many places to improve stiff soils to a very great degree; but there are few of the ordinary farmers who can be brought to use it, tho' I am fully satisfied there is hardly a better improver of clay ground among all the manures now in use; but then we must be sure to

allow enough of it, for else the clay will soon overcome it. The sea-sand is judged by some people to be better than the others, believing there is a fertilizing salt in it. But from the experiments I have seen made with all these sands, I observe that one sort renders the land as productive as the others; I cannot perceive any difference, but if they are laid upon light lands, they are destructive to them.

ABOUT Devonshire there is a sort of red rock, which is very tender, and easily beaten into sand, which being mixed with clay, or other stiff soils, renders it very fertile, as I observed in the making of a gentleman's kitchen garden beyond Exeter. Every thing that grew upon that mixture of earth, grew very luxuriant, and with great vigour: So also fine gravel will supply the want of sharp sand, if the ground be binding. I have seen good crops upon land which have been thus ordered, however unprofitable gravel is thought to be in it self. In preparing of gravel for this purpose, skreen it, or sift it in such a manner, that few stones as possible may be carried upon the land.

NEXT to these, coal-ashes are to be considered as helpful to stiff and sower land, they are much used for that purpose near some great cities where coal is used for firing. These ashes are sharp and drying, so that they

they do not only open the clays, but discharge a great deal of the viscous quality in the clay about London; especially, this is of high esteem among the gardeners and farmers, but is chiefly used to bring those grounds into order which have been dug for brick-earth; and at the first turning in of these into the clay bottom, they either sow horse-beans, or set the early Spanish, or the Windsor bean upon them; or else they lay such lands down with ever-grass, or rye-grass, which is all one under two names; both these I have known to succeed very well. I observe that generally where there are cole-pits, in Staffordshire, and the counties adjoining, there are many heavy grounds which may be much improved by coal-ashes, which might easily be burned out of the waste coal; and so wherever there are coles in plenty, and stiff soils, there can be no want of good profitable land.

ABOUT London the farmers and gardeners use the same method of manuring their lands, for, indeed, their crops are much of the same sort; the common fields being sown with Onions, Carrots, Parsnips, Pease, Beans, Kidney-beans, and planted with cabbages, &c. as well as the gardens; for where the ground will do for these things, 'tis no matter whether it be a garden or a field, the enclosure or the name makes no

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alteration in the growth of the plants; the principal manure which they most esteem, is such as they get from the lay-stalls about London. A lay-stall is an assemblage of the cleaning of the streets, the soil from houses, such as sand, cole-ashes, and the soil from the night-carts, with many other things: These are brought to certain places without the city by the scavengers continually, and after they have lain a due time to mellow, the owners of those places sell it for six-pence the cart-load, and it is experienced to be the best manure the husbandmen of Middlesex can use upon their clay grounds. There is one of these lay-stalls at White-chapel near London, which I am told has lately been valued at two thousand pounds, and upwards. But I have tried this upon some of the light soils in Surry, and they will not suffer a crop to grow; the Surry sands, and these together, burn up every thing that is sown upon them.

THE next manure which I am to take notice of, is heath-ground to mend the clay or stiff soils; this has been experienced, as I have observed before, to bring the stiff soils into good order; so that whoever has heath-ground enough, and a quantity of clay-ground, may have land of the best sort that can be desired.

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HEATH may also be burnt, and the ashes used upon clays mixed with some of the heath soil, and is very profitable; but the best way of doing this, is to cut up the heath-turf with a breast-plough, and burn the heath and turf together; and about a bushel of the ashes to a load of the heath-ground unburnt, will be of extraordinary benefit to the land. These ashes also are of great service to wet pastures that are annoyed with springs of water, and are overgrown with moss; to be sprinkled thinly upon them, chiefly about the end of September.

NEXT to this, I shall mention the turf or peat, dug out of pits; when it has lain a while to dry, and is then broken to pieces, it is full of small roots, which when they come to be exposed to the air, will rot, and greatly help to temper the stiff lands. This I have used myself, and though some of my land was upon a brick earth, it brought me extraordinary crops; and in the culture of flowers I found it to be beyond most of my prepared earths; And it is very certain, that an earth which is good for a carnation, is good for corn, and many other plants besides. We may consider that tho' turfs have been hitherto used only for firing, or for building, in some moory or boggy places, yet they are to be esteemed as fresh earth, which has lain fallow for many ages; and when

when they come to be purified by the air and weather, they cannot fail of imbibing a good share of nourishment, and of being disposed for vegetation, as much as other earths, which are not bound by too many viscous parts.

THE next to this I shall mention the tanners bark, as an extraordinary manure for clays, and other stiff soils; but this is not every where to be had: However let no one repine to fetch it eight or ten miles, even tho' it cost him some trifle at the tanyard; for the tanners have no use for it, except it is to make it into cakes for burning, which trouble they are rarely paid for. We are to look upon this in the first place to abound in vegetable parts, as it is the bark of the oak; and then as it lies a long time in the tan-vatts, with the skins and hides of animals, it must likewise partake of the animal juices: So when this comes to rot, and is nearly reduced to earth, nothing can be more helpful to poor land, if it be heavy; but if it is a light soil, this being light too, will be injurious to it. In Surry I knew a gentleman who had a large quantity of this bark, many score cart-loads which came to him by the expiration of a lease of a large tan-yard, that I advised him to lay upon a piece of stubborn sower land, and his product was so extraordinary, that it was admired

mired by all the gardeners and farmers in his neighbourhood ; this I think to be mixed with sandy soil, about one third of bark to two thirds of sand, will be a very sufficient proportion for clays, laying on about one hundred and sixty cart-loads upon an acre.

THE curious farmers which live near the sea in Devonshire, Cornwall, and other maritime parts of England, make an extraordinary manure of sea-weeds laid in heaps till they are rotten, and then laid upon the land, about a load to three rods ; but this holds but one year, unless some sand be laid or mixed with it ; and then if the sand be laid in a good quantity, the land will be good ever after. In some places this weed is gathered in heaps, and burnt as soon as it is dry, and then laid upon the land, about a bushel upon three rods ; but this like the other ashes, should be mixed with sand, or light earth, if you would have the land last good, otherwise it is only an amendment for a year. These ashes are particularly good for wet springy grass grounds, or such as are over-run with moss.

I AM next to take notice of wood-ashes, and their use in the improvement of land : I have observed before, that the ashes of burnt heath, sea-weed, &c. are of use to strew upon wet mossy ground, or such grass-land as has been too much annoyed with water :
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to these we may add, that the wood-ashes which have been used in the pot-ash houses, are accounted very beneficial to land, as well to lay upon pastures which begin to decline, as upon ploughed lands for corn; in the first, they are lasting benefits, and upon the corn land they help for a year only. These may be used like the ashes before mentioned, except the ashes from the pot-ash houses, which may be laid upon the land in greater quantity than ashes fresh burnt, or that have not been drawn with water. A bushel and half of drawn ashes, may be used for a bushel of fresh ashes; but let these always be mixed with some other light ingredient, which may be used in quantity, if it is laid on very stiff land; or if the land be not over stiff, then they may be laid upon it with less mixture. When the pot-ashes are drawn, great quantities may be gathered at the houses where they make the pot-ash; and as that particular is very profitable to the undertakers of it, I mean the making of pot-ash, I shall give my reader a full account of the method of making that rich commodity in the following chapter.

ROTTED wood, and rotted leaves of trees are extraordinary helps to land, if it is of a binding nature. The surface, or upper stratum in woods and groves, may be reckoned of this sort; and in woods of long standing,

ing, may be gathered four or five inches deep; and will be as fine as the finest wheat flower, if cattle have not spoiled it with going in the woods; there is no earth in the world finer and softer than this, nor is there any thing among all the manures which abounds so much in vegetable powers as this soil. In woods, I say, we may find this in good quantity, but my opinion is, that when it is used in the rectifying of clays, some sharp sand should be used with it, if it can be had; or any other of the sharp manures that have been mentioned before, as coleshes, sea-sand, drift-sand, fine gravel, and such like. In Berkshire, Buckinghamshire, and some other counties, which were lately abounding in woods, I remember upon grubbing up of those woods, some of the lands were sown with wheat, and produced great crops without any manure but what they had in themselves, and continue to do so; and in all cases where an extraordinary rich earth is wanted in gardens, the bottoms of wood-piles, and heaps of rotted leaves, are the most coveted, and prove the best when they are mixed with such natural earth as is a little binding: But these, where woods are not in plenty, are too scarce to do any great service in the field, but may serve to mix with other manures. Rotted wood, and leaves of themselves, lay a load on a rod
of

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of ground, which is very good allowance ; or if we mix such rotted wood and leaves with as much sand, we may greatly improve stiff soil with it, if we lay on about one hundred and sixty load on an acre, such manuring as this will keep the ground in heart for many ages. But as I have observed before, this manure is not to be had every where.

I AM next to take notice of malt-dust, after-dust, or kill or kiln-dust, which is that which drops from the malt through the wyar or hair-cloath, into the lanthorn or body of the kiln ; which I more particularly take notice of, because there is another sort which is called malt-dust, which is the sifting or skreening of the malt ; which last is good for cattle mixed with soft chaff, and therefore I think is too good for land, altho' they are both of a price, i. e. about six pence or eight pence per bushel. The custom is to lay about forty bushels upon an acre, that is, to sow it or sprinkle it upon the land when they have sown the wheat or their barley, which last it is thought is more improved by this dust, than wheat will be ; because this dust being a pure dust of barley, it contains such parts as are more profitable for barley. This manure, however, serves only for one crop, but I am persuaded that it might be rendered far more beneficial if it was to be
mixed

mixed with sandy or light earth, about a bushel of dust to five bushels of earth; and then being equally spread upon the land to be ploughed in fleet or shallow, not exceeding three inches deep.

OIL cakes are much used in some parts of Cambridgeshire, and the north part of Essex; that is, the cakes of lint-feed, rape-feed, &c. after the oil has been pressed out of them at the mills, these cakes are then ground to powder in mills, and strewed upon the ground and ploughed in. One thousand cakes are enough manure for three acres, each cake weighing about two pound and half, or three pounds, and costs now about three pound ten shillings per thousand; tho' within the space of a few years they have been sold for twenty shillings the thousand: But, however, these are profitable to land, and help to bring luxuriant crops, yet they are supposed to hurt the land afterwards; or, as the experienced farmers say, the crops are so extraordinary vigorous that are raised by this means, that the very heart of the ground is destroyed. What Virgil mentions concerning the excellency of the lees of oil in helping of corn, I am satisfied has a great deal in it; and this manure containing many oily parts, must consequently be very helpful to vegetation or the growth of plants; but to render it useful more than one year,

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the best way will be to mix it with fine earth or sand, as I have directed before for the improvement by malt dust, for that will take off its over-vigour, and be a means of bringing such crops as may be valuable, and yet preserve the land in tolerable strength.

SOOT of sea-cole, or even of wood, is much used in Hertfordshire to strew or sprinkle upon their cold clays, and sower lands; it will, however, if it is used too fresh, destroy many sorts of herbs, but it is more favourable to grass and corn, it helps to destroy moss, and is a great enemy to worms. The grass where this is laid, is observed by some authors to be very sweet, but then it is very fine too; so that it does not help grass to grow rank or luxuriant, but rather restrains the growth of grass: Therefore it must be used cautiously, and only where the land is very wet or sower. The soot of cole-ashes is preferred to that of wood, and when it is used on corn grounds, it is thought to render the corn more fruitful by checking its luxuriance: they commonly lay forty bushels upon an acre.

THE brake or fern, if it is cut and laid to rot, is used in many places to lay upon stiff land; but this will turn to much better account to make pot-ash, there being hardly any plant which produces so much salt by burning as this: However, where manures
are

success where this has been used, but it is not to be had in large quantities: however, as it is useful, we ought not to pass it by unregarded: the way of using it is the same as foot, or wood ashes.

WEEDS rotted or burnt, make very good manure for clay grounds; but they should be gathered and heaped together before they begin to flower; for there are many sorts of them, that though they are gathered when the flowers first begin to open, yet from their own juices will perfect and ripen their seeds; and so when they are rotted and are laid upon the ground, the seeds will come up and fill the ground with weeds. Of these are the dandelion, the groundsel, the thistle, and many others. If they lie till they rot, they must be used upon land like rotted wood or rotted leaves; and if they are burnt, then they must be used like wood-ashes, either simply or mixed with sand or light earth.

IN Buckinghamshire, Hertfordshire, and some parts of Essex, the farmers use woollen rags, in great quantities, which after they are chopt very small, are spread upon the land, especially such as is stiff. These are strewed upon the land just after the corn is sown and turn to good profit: the usual allowance is about twenty five, or thirty bushels to an acre.

OF HUSBANDRY. 99

LATELY the hair of hogs, and pigeons feathers, are much used to lay upon stiff land, and turn to good account; so likewise all the parts of animals: even the shavings of horn, are esteemed profitable; but in a particular manner the dung of rabbits, or the earth from a warren that has been destroyed, is said to be excellent. Particularly it has been observed, that the latter has brought such crops of wheat, that the grain was almost double in quantity, to what the best lands produced in the same country. About Cornwall, it is common to strew salt upon their land, which the farmers there suppose renders it very fertile: I have seen about four bushels laid upon an acre. About the same part of England, I have also observed the farmers near the sea shore, have manured their light lands with fish, which they have in much greater quantities than they can vend or dispose of, either at the home or foreign markets. This sort of husbandry, I suppose they learned from the people of Newfound-land, who practised that way in Mr. Hartlib's time, as he tells us in his legacy which was published in the year 1655. I suppose it is chiefly the oily part of the fish, which contributes to the fertility of the land, and will help to bind the open parts of the light land, so that it may better hold together, and its virtue

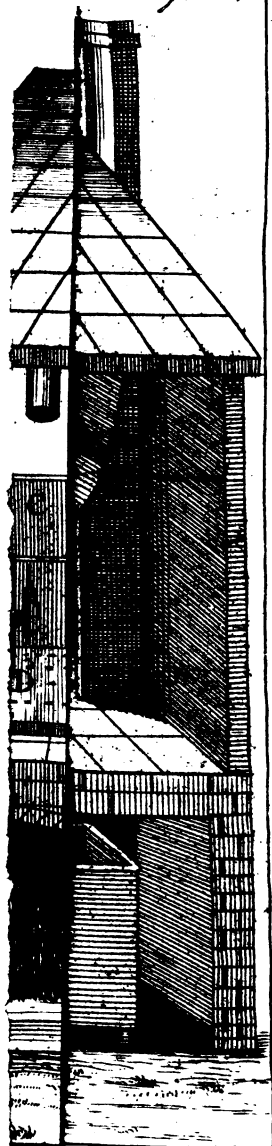
be retained from exhaling too quickly. Besides also all oils have a nourishing quality in them, as has been observed before. In the maritime parts of England, some farmers use shells, which they get from the sea-shore to help stiff soils.

I HAVE now gone through the simple manures for land, whether for those soils that are light or heavy ; but I may add that a good fresh soil is of great advantage to be laid on any land, and turns to good profit. This has been frequently experienced to do much better than dung, especially if it be fresh earth, such as Mr. Laurence calls untried earth. But I come now to speak of making the pot-ash.

C H A P. IV.

Concerning the making of Pot-ash.

CONsidering how profitable a commodity the pot-ash is in making of soap and glass, I much wonder no author has hitherto given us an account of it : especially since we have many instances of large estates that have been gained by it. But we must consider this as we do other things, that those who begin early upon such an undertaking, have the best chance to be gainers ; for let a commodity be never so valuable when is it first



first introduced, yet as it increases, the plenty of it always lowers the price and value; but we cannot be in any danger yet for many years that our markets will be over-stocked with the pot-ash; there is room enough for many great estates to be got by it, if it is rightly and carefully managed: chiefly if such works are set up in such countries where there is plenty of wood-ashes to be met with. But I shall begin to describe the pot-ash house, with the necessary utensils for making the pot-ash; and then direct the method of making of it, and the profit that may arise from it, as I had it from the curious gentleman, Colonel Bradbury, mentioned in my second Chapter of this work.

Explanation of Plate III. Shewing the manner of the Pot-ash house, and the necessary utensils for making of the pot-ash.

Fig. 1. THE pot-ash house, consisting of two stories above ground, and one under ground.

A. THE ash-room or stowedge under the tiles or thatch (for the roof may be covered with either) is a floor to lay the wood ashes into, when we have collected them and brought them home. This room reaches the length of the whole house, and must be well secured from weather: as also must be

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all the other store rooms, where you lay your ashes.

B, B, B. THREE large spouts to convey the wood ashes through the floor of the store-room into the vaults. Each of these has a little sliding door over it, to let out or keep in the ashes at discretion.

C, C, C. THREE large vats of a cubical figure, or square on all sides like a die, made of sound oaken plank, put together after the manner of water backs used by brewers. These in the figure, are represented transparent, to shew the holes at the bottom. Some use in lieu of these vats, old tobacco hogsheds, or sugar hogsheds, &c.

D, D, D. THE bottoms of the vats, with small holes bored through them, to let the liquors drain or filtre through open passages in the floor into the backs or cisterns.

E, E, E. THESE cisterns are the receivers of the lie or lixivium.

F. THE dipping vat, which is to hold the lie when it is fully prepared. In this the pea-straw, or any other fuel, is to be dipped before it is used, through the hole in the floor at G.

H. Is the rack for draining of the fuel, after it has been dipped.

I. Is the gutter or trench, to carry the lie that drips from the fuel upon the rack into the dipping vat, F.

K. Is

K. Is the chimney or burning hearth, where the pot-ash is completed.

L. THE fixed pump to serve and supply the great vats C, C, C, with water.

M. Is the dutch barn, wherein the pea-straw or other fuel is kept dry.

N. THE pot-ash, after it is burnt and dug from the hearth.

O. THE vessels or casks to pack the pot-ash in.

P. THE mattock to dig and raise the pot-ash from the hearth, after it is burnt.

The method of preparing the pot-ash.

To begin this work, we must first lay into the vats C, C, C, a quantity of pea-straw, or pea-halm, to be trodden hard to the bottom, till it lies about a foot thick.

SECONDLY fill the ashes into these vats till they reach within eighteen inches of the top, and then fill them brim full of water, which liquor will filter through the ashes into the receiver backs E, E, E, and must be passed so often through the ashes, till it is strong enough to bear an egg, then this liquor will be fit for use, and must then with a hand pump and trough, be pumped into the dipping vat F, which may hold about four hogsheds; but the great vats C, C, C, may hold about one hundred and sixty, or two hundred bushels each.

IN the next place we must have ready, pea-straw, bean-straw, brush-wood, fern, furze, heath, or ling, or any other fuel that will burn to a white ash, abounding in salts.

THESE we must dip in the lie or lixivium, contained in the vat F, and lay them to drain on the rack H ; and as soon as they have done dropping, lay them by degrees on the fire prepared for that purpose in the chimney or hearth K. Note this fire must be maintained by the prepared fuel only, for any other mixture of fuel will spoil the whole ; and it is to be observed that this fire will not flame but moulder, and fall into an ash of very hard consistency, which is the real pot-ash ; and when the hearth is full enough of it, it must be dug up with a mattock or pick-ax, and put into casks, which may be such as the tobacconists or sugar-bakers have done with. The boughs of green elder are judged to be extraordinary fuel for this use.

A LARGE load of dry pea-straw, will burn to about four hundred weight or four hundred and half of pot-ash : but such fuel as is green will burn to much more in proportion.

THE wood-ashes with which the lie or lixivium is made, is collected from such houses as burn much wood, and is bought there

there at about three-pence per bushel, which with the expence of a man and horse to collect them, will make them worth at the pot-ash house, about five-pence or six-pence per bushel. It must be noted that those people who save their wood-ashes, must keep them in a dry place ; for the least wet imaginable, makes them loose their virtue, and renders them unfit for this work. Where there are brick kilns that are burnt with wood, the wood-ashes of such places are excellent ; for as great part of the smoke is stifled or kept in by such kilns, those ashes are fuller of salts than the ashes that are burnt where the smoke has more liberty : and the lie or lixivium, will be much stronger than that which is made of other ashes, using the same proportion of each sort, so that those of brickkilns, will go farther than others : and it is for reasons of this kind that one cannot make any certain computation of the quantity of ashes required for making a certain quantity of lie or lixivium. However, the makers of this commodity, who will speak freely of their profits, confess that when all materials were to be had in plenty, they have been gainers above one third by it.

IN Russia, they make abundance of pot-ash, and it was a long time England had all or most of its pot-ash from thence ; for it
is

is but lately that the business of making pot-ash has been practised in England. Muscovy or Russia, abounding in fir trees, pine trees, and others, which are full of resinous juices, we may suppose that most of the ashes they use for their lie or lixivium, is made of deal wood: and I suppose those ashes are stronger than others.

It is also to be observed, that when I speak of burning green fuel, I mean such as has been cut long enough to have the bark a little shrunk, and stick to the wood before we use it.

LASTLY, I am to observe, that as the pot-ash is used in very large quantities for making of glass and soap, so those who erect pot-ash houses, will have much greater profit and conveniency if they set up such a business near a navigable river, but especially it should be in a country where much wood is burnt, to make the lie or lixivium with; and where may be had plenty of fuel, such as I have mentioned before, to burn into pot-ash. At this time I am informed pot-ash is sold for about five and twenty shillings and thirty shillings per hundred. It must be noted that in burning of pot-ash, we must never use above one sort of fuel, for mixture will spoil it.

C H A P. V.

Of composts, or mixt manures.

THERE are two ways of making composts or mixt manures for land; viz. either in laystalls or pits.

By the laystall is meant an heap or hill of any dung or other manure, either simple or compound. These are generally made by the farmers in Middlesex, or near London, in such places as lye the most commodious for their lands, either in breaks or wafts near the high-way sides. In the first place they plough up a piece of ground as large as may be for their purpose, early in the spring of the year, and every journey they make to the London markets, which is three or four times a week, they load home with dung, which they have commonly at the Mews, and Inns, for fetching away. This they lay all over the ploughed piece, and then cover it with the London laystall-dirt of a good thickness; for which they pay about six-pence a load; and then upon that, more dung, and so continue till they have manure enough for the ground they design to improve. The most understanding among them covet to have their heaps completed before the end of April; and employ

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ploy their teams many times on purpose to get this work finished betimes; for the sooner this is done, the sooner it will be fit to turn; and the sooner it is turned, the sooner it will mellow and be fit for use. If this work is completed in April, it should be dug in July, and turned to the bottom, and the ploughed earth mixed with it. But when this heap is not completed till May or June, for sometimes the farmers make summer's work of it, then it should not be turned till September. It must be observed, that the roads about London, since the turnpikes have been set up, are as good in the winter as in the summer: so that for carriage of these manures, it is all one to the farmer, excepting only that in winter he has a better opportunity of getting dung from London, the town then being full of horses, at least ten times as many as there are in summer. These dunghills, or laystalls, are commonly about three or four foot high, rising a little about the middle, when they are first made, but will sink about a foot when they have lain three months. To these some farmers put earth, and the cleaning of ponds and ditches, or drift-ways, which greatly help to improve this soil, and qualify it for strong lands, which are frequent enough in most parts of Middlesex. When they carry these upon the lands, they
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generally dig up a full spit of the earth at the bottom of the dung.

OF the composts in pits, there are many sorts, according to the nature of the farms where they are made : however, they are all collected after the same manner.

A PIT should be dug either in some corner of the farm-yard, or some place near it, into which the drains from the kitchen, skullery, dairy, hogs-cott, and stables, should be conveyed, into this all weeds, mowings of grass-walks, the cleaning of the hogs-cotts, dove-cotts, hen-houses, cole-ashes, and in a word, every thing which would be thrown away : then when the pit is full should be dug out, and about a foot thick of the earth, which encompasses the pit, should also be dug and mixed with it, provided it is any thing tolerable ; and at the bottom of the pit, there may be taken about two foot deep of the earth, and mixt with the rest. This then should be carried to some corner of a field, and being there mixt with some common earth, let it lye in an heap till it be quite rotted, and then should be spread upon the land ; for if we were to use it as it came out of the pit, it would indeed force one crop but no more, but by mixing it with earth it will mend the ground for several years. About fifty or sixty cart loads of this, without earth, may
be

FIG A COMPLETE BODY

be laid upon an acre, or more or less, as the ingredients are more or less hot; but if it is mixt with earth, then you may lay on about fourscore loads on an acre.

It is to be noted that the water out of these pits, is carried upon lands with very good success, being put into vessels or water-carts, and let out through a leather pipe with a rose to sprinkle the land. So likewise the liquor out of town-vaults is very helpful to ground for either corn or grass.

I COME next to speak of the improvement of wet and cold lands, by draining and watering.

C H A P VI.

Of draining and watering of lands.

THIS chapter relates to the improvement of lands by draining and watering. I shall begin with some observations of Mr. Fitz Herbarde, written in the year 1500.

THERE is none other remedy for marrys (marsh) ground, but first to drain the water clean away. And this is a good means to drain the water away first in the lowest close (or part of the field) where the water may be best voided (discharged) make a great ditch, and deep, that the water may avoid

OF HUSBANDRY. 111

avoid (go off): and if all the water will not come to that great ditch; but stands still in divers places, then make many small ditches one into another, from the said standing waters; so that all these standing waters may come into the great ditch, and that, by reason should drain the water clean; and in a dry summer, ye may make many broad and deep ditches, and sever (divide) the marrys into divers pastures, and make bridges over the ditches into every close, and divers lanes made like a causeway, to convey the cattle into pastures; so that one causeway or lane, may serve the pastures on both sides. And in the lowest place of every close or pasture, make a trench or little ditch, into the great ditch that goeth about: and thus shall ye make by process, good pastures of marsh ground, and ever the longer the better pastures (i. e. which pastures will continually improve) and especially if you put in much cattle, it shall make the better grass and the finer. Milche kye, (milcht cows) draught oxen, and labouring horses, is the best cattle to make good pasture on marrys ground, and sheep on dry ground; for they will eat the ground barest (will bite short) and that causeth the grass to be good and fine. And if this manner of ditching will not make the marsh ground dry, then must you make a slough (drain or hollow ditch) under-

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underneath the earth ; and if that will not serve, then keep out your cattle for fear of drowning.

THUS far Mr. Fitz Herbarde : the first method he prescribes, is practised in the marshes in Essex, near Stratford ; and they constantly bring great crops of hay every summer, besides excellent food for cattle afterwards ; though indeed they are subject to be overflowed in the winter, but the summer crops are so much the better for it, that the farmer rather receives profit than loss. But these grounds lying upon the flat for the most part, they are forced to lay their drains so low that they are obliged to carry off their waters in wooden troughs, under some of the rivers, till they bring them to a proper place of discharge into the river Thames, which they run into at low water ; and upon the rise of the tide in the Thames, are prevented from returning by sluices.

BUT there are some other marsh-lands or bogg-grounds, which notwithstanding drains cut into one another, as above mentioned by the old gentleman, are yet annoyed with water. In this case we must make our ditches or drains wide and deep, and in number in proportion to the height of the water that lyes upon the lands. If we have twenty acres, for example, which lye covered half a foot thick with water, the proportion of
drains

drains for these must be such as will receive this water : they may be made wide and deep, either more or less, as you make them longer or shorter, or more or less in number. For example, if a rod of ground could be dug downright on every side, without slopes to keep up its banks or sides ; if this could be, I say, dug six foot deep, then the water that covered this and eleven rods more, half a foot high, would be contained in it, and the earth that came out of it would raise the space of near as much more, above the waters, so that the quantity of a rod so dug, would gain about eighteen or twenty rods, allowing for the slopes that must be left in digging the rod of ground six foot deep. From this one may guess what proportion of land ought to be dug to discover the twenty acres from the water that lay upon them ; or if there were a thousand or more of acres, the proportion of ditches must be equivalent.

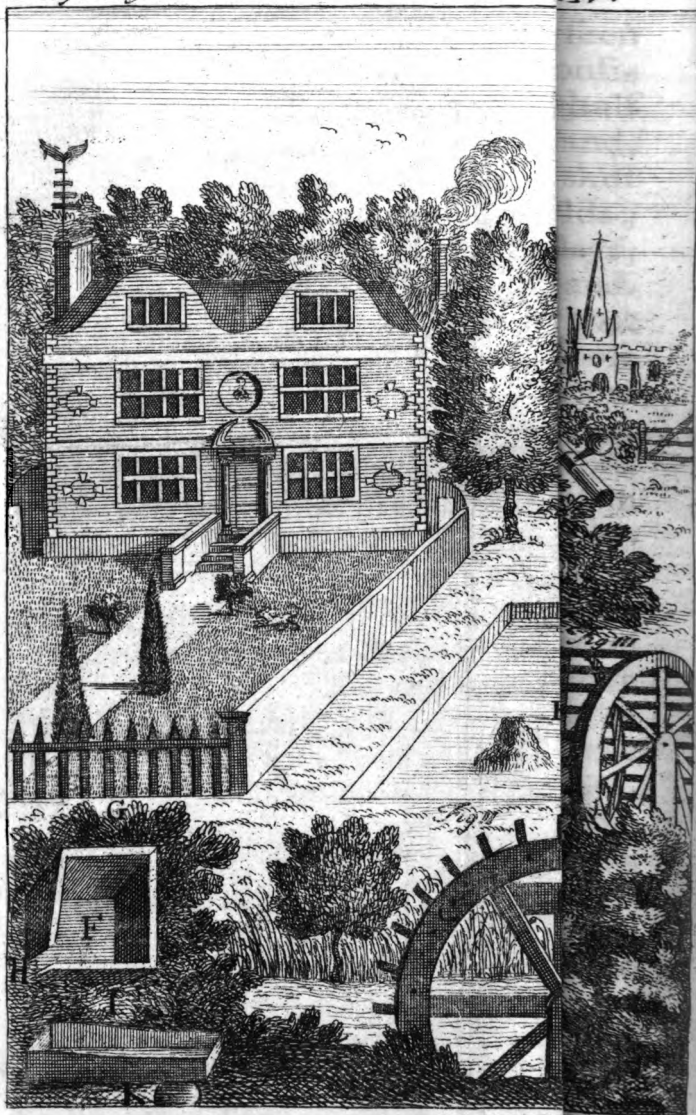
AGAIN, Mr. Fitz Herbarde, very well observes, that in the making of these drains, they should be so contrived as to lay the ground into severals, so commodiously disposed, that one lane or road, may lead to all ; for by the commodious situation of fields, there is much trouble saved to the husbandman ; and besides one road leading to all, may be better kept than various roads,

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and

and much land saved by it. I have seen estates where this has been so little considered, that to forty fields, there has been half as many roads ; when on the other hand, there are estates laid out with so much skill that one road has served for all the fields ; but I shall say more of this in another place, when I shall treat of enclosing of land. When I speak of improving ground that is overflowed this way, we are to suppose that there is no current for the water, and therefore there can be no other remedy but what is here prescribed, unless it be done by wind-mills, such as are in Holland, in the isle of Ely, and in the fens in Lincolnshire, which will discharge the water over any banks that happen to be of a moderate height about it ; or else if such a piece of ground be encompassed with hills, it may be drained by wind-mills, and chains of buckets, which will carry the water over the hills, or else it might be done with a crane, provided the land on the out side of the hills is lower than the waters on the inside of the hills : but because these cranes must be of a very large size, and to the common people perhaps somewhat difficult to set to work, I shall here give a figure of one of them, with an explanation. Plate IV. contains a view of the crane carried over a hill to discharge the water from a pool or lake.

It



It also gives us two views of the persian-wheel to raise water out of rivers into ponds which lye higher than the rivers, and likewise shews us how drains ought to be cut one into another, to drain wet pasture grounds. I shall begin with the crane.

Plate IV. Fig. 1. **THIS** crane is upon the principle of the common cranes, which are used by the wine-coopers and distillers, or such as are for decanting of liquors; which must have the end by which the liquor is discharged lower than the end of the pipe by which it is received; and all the air must be discharged from the pipe, before the liquor will pass through it.

N° 1. Is the mouth of the crane, which should reach the bottom of the pool **A**: close to the month **1**, is a cock to be opened or shut at pleasure.

FROM N° 1 to 2, are elm pipes, which must be very closely jointed: These pipes may lye either upon the side of the hill or be covered a foot or two with earth.

N° 2. Is a block of wood through which the pipes pass to **N° 3**.

N° 3. Must be observed to be lower than **N° 1**.

FROM N° 2 to N° 3, are pipes of elm closely jointed as before.

AT N° 3, there is a cock to be shut and opened at pleasure at **N° 2**, where
1 2
the

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the block is placed. There must be a cock to shut and open close to the pipes, and a vessel over it, made in the manner of a funnel, into which the water must be put to fill the pipes when we have a mind to set the crane to work.

It must be noted that before we lay this crane of pipes, we must make a large hole below N° 1, for the mouth of the crane to go into, that we may drain the place quite dry. But I come now to shew how this crane ought to be set to work.

WHEN we would set this crane to work, open the cock at N° 2, and shut the cocks at N° 1, and N° 4; and pour water in at the funnel till the pipes from N° 1 to N° 2, are full: then the cock N° 3, being shut, and that at N° 4, being opened, continue to pour water into the pipes till all are full and run over; then shut the cock at N° 2, as close as possible, that no air get into the pipes; for the pouring in of the water by degrees, will drive all the air upwards, which will discharge it self at the funnel N° 2; and then will be fit for action. When the cocks N° 1 and N° 3 are opened, this crane then will work and continue so to do till all the water in the pool, A, is drawn out; for this crane will draw water as long as the mouth at N° 1, lies completely in water; but as soon as ever the least air gets
into

into the mouth of that pipe, the whole motion is stoped.

BUT this crane is not only of use for draining of pooles, but is also of extraordinary service to convey water over a hill to any place on the other side, which lies lower than the water it is drawn from. Some towns may be well served with water this way ; but I cannot take this thought to my self no more than I have done any others that have been communicated to me. I received it from Mr. Harding, a very ingenious founder and master of mechanicks, near Cupid's Stairs, over-against Summer-set-House, London. I wish every author would be as just : for I judge that a writer, who composes a work from the knowledge of other people, without an acknowledgement due to the inventers, is like the daw in the fable, that dressed himself in the fine feathers of other birds, and at length was found out, and hissed out of the society.

BUT to proceed : I am in the next place to take notice of the persian-wheel, which is a very useful invention for raising waters from rivers, or any stream, to a small height, as eight, ten, or twelve foot ; and by that means to supply ponds, canals, or houses, that lie upon ground above the river.

Mr. MORTIMER, has given us a draught of one sort of this wheel, as well as some other

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authors ; but I think it may not be disagreeable to my readers, if I here explain the manner of it a little further, and set down some particulars which have not been taken notice of in any work.

Fig. 2, Is the view of the flat side of the wheel, which must be such a one as is used for water-mills, set with trenches or buckets,

B, ONE of the rests or blocks, upon which the wheel turns, so that the axis of the wheel may be raised so high that the buckets may dip in the stream ; by which means the wheel is turned. The dots or points in the rowel-boards, compass, or side-ledge of the wheel. At C C, mark the distances of the water-buckets ; but in this figure they cannot appear, as they are obliged to be put on the other side : however, I shall explain them by another figure.

THE reason why the water bukets are on the other side of this wheel, is because they are to empty themselves into a receiving trough D, from whence the water received, passes through pipes and rises in the pond above at E, or might be conveyed through pipes to a cistern, at the house above.

THE receiving trough D, must be placed just under the water bukets, so that when two or three of them discharge their
water,

water, which they will do when they rise to the top, the water may all be caught by the receiving trough.

F, Is a view of one of the water-buckets, which may hold about a gallon. This must be fixed to the side of the rowel-board, so that as the wheel turns round, the part of the bucket marked G, may dip up the water; and the part of the said water-bucket, as it comes up, will empty it self at H, into the receiving trough I. This trough is fastened to a pipe of elm, through which the water falls into a line of pipes that run to E, where the water rises and discharges it self to as great a height as the receiving trough happens to be set, which must be higher or lower, as the diameter of the great wheel happens to be; for this trough must be as near as possible to the water-buckets, provided it does not interrupt them, as they go round K, the pipe through which the water falls from the receiver into the line of pipes.

Fig. 3. ANOTHER prospect of the same wheel, whereby one may discover the water-buckets L, jutting from the rowel-boards or side-ledges of the wheel which go down empty and come up full of water, discharging it into the receiving trough M; but such as would rather see the wheel it self, I shall refer them to that at Sir James

Clarke's at Molesey in Surry, or that at Moor-park, the seat of John Temple, Esq; near Farnham in the same county, but the latter I think is much the best contrived of the two, though they are both very good, and answer nearly the same end, which is to furnish ponds and canals with water, that lie upon higher ground than the river.

OR in case one has already a canal which has been only fed with land waters, which in a dry season will yield an offensive smell, if there happens to be a river a little below it, as eight, ten, or twelve foot, for example; we may with one of these wheels sling fresh water continually into the canal; and having at one end of the pond a pipe to carry off the waste water, the whole body of water in the canal, will be in a few days cleared and rectified by the fresh water out of the river, and then may constantly be supplied and kept clean.

ONE of these wheels may perhaps carry eighteen buckets, each bucket containing a gallon of water, and the wheel will go round about four times in a minute, so then such a wheel will raise seventy two gallons in a minute, or we will suppose an hog-head only of water in that time, which is sixty three gallons; and in twenty four hours, which is a natural day, the said wheel will raise at a moderate computation,
one

one thousand four hundred and forty hogs-heads of water.

Fig. 4. Is a view of the drains which are commonly cut in a meadow or pasture ground annoyed with water, which should be made from the higher part where there is water ; and from all other watery places in the same field should be laid other drains into the main drain, as marked N, N, which will carry off the water. It might be so provided in the cutting of the drains for the water, if mills are not used, that the great or main drain might be made large enough to carry great boats or barges, which in large works would turn to good account, and save carriage : And such a large drain or canal might feed a great number of good fish, which would be of good profit ; but where there is a natural fall from any ground oppressed with water, a few common currents leading into one another, will soon lay it dry, and keep it so, especially if the drains are made in the manner of hollow ditching. What is called hollow ditching, is made under ground, in the manner following : When you have a piece of ground which lies wet, and is a kind of sike, so that one cannot tread upon it, but the water feels like a quag under ones feet ; then we may suppose there is a spring, either in that ground which wants to be discharged, or else that it comes from

from some place adjacent, and not having opportunity of breaking out, works under ground, as I have known often between the land and the turf. I observe that this land is commonly found near woods, or where woods have been; and the grass lands that are thus annoyed, are always mossy, and commonly over-run with rushes. The cure for this evil is, if there is a declivity, to cut trenches from the upper part, to fall to the bottom, by running into one, two or three leading trenches, which will be much better than one leading trench; because if we had but one leader, or main drain, which must run from the higher to the lower ground through the middle, that must necessarily be so large, that nothing but an arch of brick-work would bear the earth, which ought to be upon it. But where there are two, three, or four of such leading trenches, we make them with great ease and facility.

IN the making of these drains, we must observe to have them fall gently as the ground declines, and not too suddenly, but that the drains may gradually decline; so that they may rather discharge themselves above, than below the drain or ditch at the bottom of the field. The best way to do this, is to begin to draw the main drains from the lower part of the ground, and to work upwards; and then the work, if it hap-

OF HUSBANDRY. 123

happens to be any ways amiss, may be mended; and so the cross drains which lead into the main drains, should likewise be begun at the lower side of the field, and be wrought upwards in such a manner, as to pass the main drains equally deep. These drains, whether they be the great or small ones, must be made two full spits of a spade deep, and half a spit sloping on each side, from near three foot wide at the top, to about half a foot at the bottom; and then some large rough stones, or cows horns, laid at the bottom for the water to run through, with some straw over them; or else a few boughs of elm, white-thorn, or haw-thorn rammed into the bottom, and straw laid over them, and then covered with the earth that was dug out. When all are completed and settled, then you may plough the piece, and dispose it equally on such a level as it will bear. This method is accounted the best and cheapest way of hollow ditching, or draining, and will make the wettest squally land fit to bring very good corn, or to be laid down for grass, or other uses. The common price for digging and laying the stones or bushes, and filling up the drains, is about two pence half-penny or three-pence a rod in length; but the owner or possessor of the ground must find bushes, or stones, and straw, which, together with the digging and lay-

laying, will amount to about six-pence a rod. A large field, I confess, will amount to some money; as suppose there may be required one thousand rod of this work to drain twenty acres, the expence at six-pence the rod will be twenty five pounds; or after the rate of one pound five shillings for the improvement of each acre, which is but a trifle considering that the ground before was neither good for bearing corn or grass, and will now bring good crops of any kind. This improvement is chiefly practised in Essex; I have seen it at Navestock on the forest, at an estate belonging to Aaron Harrington, Esq; and it is lately brought from that part of the country to the North of Essex, about Wicken-Benant, and near Sir Kane James's; and I doubt not but will be generally used upon all the squally wet grounds in England when it comes to be known, for it is but a late invention; only it is to be noted that the ground should lie sloping, or declining one way or other to be mended by this means.

If by chance we happen to meet with a piece of ground annoyed with water, as I have remarked above, and that the ground is upon a dead level, we must either take off the earth from both sides, and raise it in the middle, or else take earth from one side, and carry it to the opposite side to raise that, till we

we have laid the whole field upon a declivity, with such a fall as may carry off the water that may come into the drains. This I have seen done, and the drains made with very good success; so that the land which was at first esteemed worth hardly a shilling an acre, was then esteemed worth above thirty shillings an acre, if it had been laid down for grass, or would have brought excellent corn. Before this method was used with it, the whole ground was over-run with moss and rushes. Note, this hollow ditching should be done in the summer season.

AFTER having given my reader the necessary directions for improving his marsh and wet lands by draining the waters from them, I come next to speak of the improvement that may be made upon lands by watering them; I mean grass lands, that are either pasture or meadows: From whence we may perceive how necessary it is to have the command of water in every farm, i. e. to correct the too great abundance of it in one case, and to have it in our power to bring it upon land when we have occasion for it. The watering of grounds is no new thing, and is practised in some places with great charge and difficulty, especially upon meadows. By this means the grass is so much helped in its growth, that it will yield near twice as much more as it would have done with-

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without watering, especially if the summer prove dry. This summer anno 1726, I have known good promising crops of grass in the first part of the spring, while the ground was moist, which when the dry weather came, in the middle of April and in May, the land was so dried and parched, that there was scarce half a load of hay made upon an acre; but the months June and July being for the most part wet, there was a second crop of good sweet grass, that yielded upon the same ground above two loads and half of hay upon each acre. The soil where I observed this, was a sort of sandy loam, about eight or nine inches deep, with a gravelly bottom: There was no possibility here of bringing any water to help it in a dry season, but I bring it as an instance to shew how much water contributes to render such land valuable. In the dry season there was scarce half a load, and in the wet season, tho' at the worst time of the grass, there was two loads and half upon an acre; which shews, that where one has the command of water to flow upon such grass grounds when dry seasons happen, we may reap by that means four times as much more profit, as we can do without it. But as the lands I speak of had no opportunity of this help, the marshes near at hand, which had the advantage of water, pro-

produced above three loads of hay upon an acre in their spring crops; but there was no opportunity of seeing what their second crop would be, because they were fed with cattle all the summer.

WHEN we have water at command to flow our grass grounds, we must observe that it will rather do harm than good, if our grounds upon which we turn our water are not level; for should they happen to lie sloping, or upon declivities, the letting in of water upon them would wash the earth from the tops of such fields into the lower parts, and thereby impoverish the upper parts, while those on the lower side will be enriched. Neither will water be useful to level grounds, unless we can secure a convenience for carrying it off when we please; for were it to lie long upon grass, it would rot it.

I REMEMBER some grass fields which lay gently sloping that were watered every year, and the consequence was, that by watering, three of the top acres would hardly produce a load of hay, and two others at the bottom would bring about six load between them; whereas the ground of one field, which was five acres, used to bring before it was watered about the same quantity; so that after all this trouble there was only this alteration in the crop, that there
was

was gathered the greatest part of it from two acres that were mended, and had spoiled the rest: So that it could not be said the farmer was advantaged by it.

It is very certain that all land lying at the bottom of hills is very rich for grass, which is occasioned by the washing of the hills upon every fall of rain, which carries only the finest parts along with it upon the lower grounds; which parts being interrupted by the grass in their passage with the waters, settle about the roots of the grass, and give it that vigour which we always observe in low grounds; but at the same time the hills are impoverished by every rain, and is the reason why hills are not so fruitful as the valleys.

WHEN we have a level piece of grass ground which we have the opportunity of watering, we must observe that the best season for helping of grass lands with water is in the spring. About March we may overflow it for four or five days, and then draw off the water; and if the weather be warm and dry, we may again repeat watering about a fortnight after, but only flow it, without laying the water high enough to cover the grass for a day or two; and so from fortnight to fortnight, continue such refreshment to the grass while it is growing; or till the spires or heads of seeds appear: But care must

must be taken in the latter waterings not to let the water lie long, because the bottom or staple of your grāss will be subject to turn yellow, and to rot; which must by all means be avoided. Nay, if the weather should happen to be wet, and the bottom of the grāss begin to change, it is better to cut it down, and venture it to lie in the swarth, than let it stand; for that will be a means of giving it air, and prevent it from rotting, and a few days rain after it is cut down will do it no harm. As to the making of hay, I shall treat of that in another place. Mr. Fitz-Herbarde, treating of the improvement of meadows, tells us.

There is a manner of mending of meadows, if there be any rynynge (running) water or land flood, that may be set, or brought to run over the meadowes, from the time that they be mowen, unto the begynnyng of May, and they will be moche (much) the better; and it shall kill, drowen and drive away the moldy weepes (mole-hills, or ant-hills) and fill up the low places with sands, and make the ground even and good to mowe. All manner of waters be good, so that they stand not still upon the ground. But specially that water that cometh out of a town from every man's mydding or dunghill is best, and will make the meadows most rankest. And fro (from) the begynnyng of May,

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till

till the meadows be mowen, and the hay gotten in, the waters would be let by (should be kept off) and run another way for dyvers considerations. Thus far my old gentleman concerning meadows. I shall now proceed to speak of the mending of such lands, as are properly pastures for cattle. I have already said in the article of cow-dung, that the cow-herds near London about September, spread that soil over their pasture grounds, which renders them very fertile, and gives them a good swarth for the winter; but these lands are not troubled with waters, and there remains yet more labour to assist our pastures; for generally some are annoyed with bushes, some lie too wet, others are over-run with gors or furze, broom, &c. Every one of which I shall have occasion to treat of. Mr. Fitz-Herbarde tells us ~~We~~ shall do by your pastures in low ground as I have shewed you in the article of meadows, and if any water stand styll and will not boyle, make a dyche, or two or three, as need shall require, and open the sides of the dyche (ditch) that the water may come into it; and to convey the water away, with a plough make dyvers furrowes from the said dyche, up into the pasture where the water standeth; and with a cart, a wayne, or a sleide (a sledge) carry away the earth that the plough turneth up, or else it will stopp
the

the water on the one syde, and see that thou leave no water standyng in the pasture no tyme of the year. And melce kye (milcht cows) draught oxen, labouring horses, and mares, be most convenient to go together in such pastures.

SUCH water furrows as Mr. Fitz-Herbarde mentions, may be made sixteen inches deep, if there is occasion, by the double-breasted plough of Colonel Bradbury's invention. But it is seldom such trenches are wanting in pasture grounds; unless it be the main drain, which one may observe in the fourth figure of plate IV, is much larger than the others.

ALL wet pastures being well drained by open trenches or ditches, are in a condition then of bringing good grafs, either from the improvement the dung of the cattle will make on them, or else before we graze them; if the ground be poor, to cut up the ant-hills or mole-hills, with one of the ploughs mentioned in the second chapter; and then spreading it with a fork, and after that harrowing the whole with bushes of white-thorn, spread and tied together with a good weight upon them; by which means the mould of the ant-hills will be broken very fine, and fall close about the roots of the grafs, and then should be rolled with a weighty wooden roller, if the ground is level

vel enough, which will much mend it. Mr. Fitz-Herbarde directs the taking away, or carrying off the earth which is turned out of the trenches, which we dig or plough in our wet grass grounds, but now we find it advantageous to spread such earth upon the land; but be sure that the land be first well drained, for else where the waters have any command, they will drive the manure or fine earth I speak of, from one place to another, and by that means destroy our work. As for hollow ditching, in the case of meadows or pastures that we design to lay down from very wet or swampy grounds, it is necessary, because such lands must be well drained and kept dry, that it may bring good corn, first after it is broken up; and hollow ditching, which I have fully explained in this chapter, is the only way to do it; and besides too it will be the surest way to keep such land from becoming squalely or boggy, where it is laid down for grass.

It is no less necessary to take notice, that all lands sown with winter corn, must be carefully provided with water thorows at the time of ploughing; so that there may be a free passage for the water to run off when great rains happen. But notwithstanding such throws or thorows are well made, yet if the winter season happens to abound in
wet,

wet, we must frequently visit them, and open the lower parts of them with a spade, to let out the waters that will lodge there, being shut in, or prevented going off by the drift of sandy or light earth, which the great rains will drive down. In the making these water thorows, great care should be taken; first, to observe the situation and disposition of the field, that the water thorows may be so contrived, as to lead from the higher grounds to the lower parts, and to cross the furrows of the field; so that the water which runs down the furrows of the lands may fall into the water thorows, and by them be carried clear off the ground; for nothing is more injurious to winter corn, than to have the waters lie upon it, which will soon make it turn yellow, and rot the roots.

I CANNOT help taking notice of the use of the word *furrow* among the farmers; some mean it for the whole length of the ridge, others use it for the way of the plough, cross a field; but the word as it is used by those of good understanding, means the hollow between the ridges. So that a field which is ploughed for wheat, is said to lie ridge and furrow; so some use the word *thorow*, instead of *furrow*; but I find the word *thorow* is a distinguishing character for a trench cut purposely for carrying off of water. So those trenches which are

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made

made purposely for this use, are called water thorrows.

C H A P. VII.

Of the Improvement of busky and mossey Ground, that hath been arable Land heretofore.

MR. Fitz-Herbarde gives us his opinion of this improvement, in the following words.

The remedy is to stock and get up the bushes by the roots, and the land ploughed and sown; the rest-ground (staple or surface) if it be dry, will bring much corn; for the moss will rot, and the mole-hills (mole-hills) will amend the ground well; And if there be any marle pyttes (pits) that have been made of old time within the same close; then when the lands begin to weare, they should be new marled, the which is moche better than outhere (either) donge, muck or lyme, for it will last twenty years together if it be well done, and shall be the better while it is land. And I marvaill greatly that in the common fields, where of old tyme, hath been made many great marle pyttes, the which hath done moche good to the

the landes, that now adays no man doth occupy them, ne (nor) make none other; and they nede not to doubt but there is marle now, as well as was then; but as me seemeth there be two causes why, one is, the tenauntes (tenants) be so doubtful of their landlordes, that yf they should marle and make their holdynges (farms) moche better, they fear least they should be put out, or make a great fine, or els to pay more rent. And if a lord so do, me seemeth he is unreasonable, seeyng (seeing) that it was done all at the costes of the tenant, and not at his.

The seconde cause is, that men be disposed to ydelnesse (idleness) and wyl not labour, as they have in times past, but passe forth the tyme as his father did before hym. But me seemeth a freeholder should not be of that condiction, for he is in a surety; his chief lord cannot put him out doyng (doing) his dutie, and he knoweth well, he shall take the profite whyle he liveth, and his heires after him, so that he should have courage to improve his owne, the which is as good as and he had purchased as moche as the improvement cometh to; and one man this doyng (doing) wolde give other men a courage and a good example to follow the same. And all other countries may take ensample at Chesheshire and Lancastershire, for ma-

ny of them that have so done, have made the improvement as good as the land was before, &c.

The first part of this chapter, as it relates to the grubbing up of bushes, so will it be necessary to mention the several ways which are used to effect it with the greatest facility, for there are many ; and this is a work absolutely necessary to be done before we can pretend to plough the land ; for let us design the ground for any thing, such bushes are always looked upon as so many evils. In arable lands the roots interrupt the plough, in pasture lands they stand in the place of good grass, and in meadows they spoil the scythe, besides the loss of grass that will be where they grow.

IF such bushes happen to sprout from old stumps, then there is no other remedy but taking them up with a mattock ; but this is an expensive way, tho' some will do it for the roots.

IN this work there is more or less care required, as the shrubs or bushes are of different kinds ; the black-thorn, the white-thorn, oak, ash, beech, horn-beam, and such like, will not leave any growing roots behind them ; but arbee, alder, elm, or any of the willow kind, must be cleanly plucked up or eradicated, because they are apt to grow a-fresh from every little bit. Where such bushes

bushes happen to grow in clusters, the gentleman, whom I have had occasion to mention before, Colonel Bradbury, has used the following method, which Mr. Mortimer has also given us in his book of husbandry; where the bushes grow thick or close together, and are tall enough, the quickest way is to enclose as many as possible in a chain of iron, such as they use for timber, and then to tear them up by the roots, with a team of horses, fewer or more horses in number, as less or more strength is required. And then to the next, which must be treated in the same manner. Great numbers may be drawn up by this means in a day; and may be then fagotted up.

IN pasture grounds however, it is necessary to preserve some of the tallest bushes, either in corners or on the sides, for the shelter of the cattle; but then these should be of such sorts as are profitable. And this I think ought be considered more than it is in those places where there are shaws, which for the most part, are in very ill condition, being over-grown with brambles and briers, and take up a great deal of good room into the bargain. Yet I find that it is a common rule to direct in the leases, that a tenant shall not destroy them or alter them, which I think is no wise method; for the ground they grow upon, may better bear profitable

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ble trees, which will be a much better shelter to cattle than bushes; such as the shaws are generally composed of.

BUT to return to the eradicating of bushes; when we are to draw up a single one, Mr. Mortimer recommends an engine or instrument to be used by a single man, which is very useful; but his figure I think, is not quite so perfect as it might have been, if it had been engraved on a copper-plate, and all the parts shewn more distinctly; and besides, as I find I can make some addition to it, I shall here give my reader a view of it.

Mr. MORTIMER's, engine is composed of a pole or piece of clean tough wood, about four foot long, such as is represented at A. Fig. 1, Plate V, in which at the place marked B, there is an iron hook drove tight in; and at C, there is another jagged hook which is fastned to the pole by a bolt, which goes quite through it, and is then keyed in as at D. The bottom part of the pole should be fixed in a socket of iron, with two forks at the end of it crooked toward the points, as marked at E. This is not in Mr. Mortimer, and serves to take better hold of the ground, than the instrument he mentions.

TO use this for drawing a single bush, they put the head of the pole A, from them, fixing the forks E, in the ground, and then
catch

catch hold of the stem of a young quick or bush, which they would pull up with the hook C; and then bending the stem of the plant they have hold of, to the hook B, put it under that hook, which will fasten the plant to the instrument, so that it cannot slip, and then forcing the head of the pole A, upwards, with their shoulders, they force the plant quite out of the ground, but it must be supposed that the closeness of the hook C, and the jagged teeth in it, will rend and slip the bark; therefore if we draw quick or whitethorn, with this instrument, we must observe to fix our hooks as near the top of the plant as possible, that when we have the plant out of the ground, we may at least have six inches of the stem clear from wounds or the shattered bark; for if we draw our quick for planting in hedges, there must be good six inches of clean stem to plant according to the common method; but I think, though this instrument or something like it, is frequently used for eradicating or rooting up of small bushes or broom, &c. yet the following, which is the invention of Colonel Bradbury aforesaid, is much preferable, as having more strength and more play than the former,

Fig. 2. A T A, is the top of the pole or beam, which should be about five or six foot long, made of sound, clear elm, with-
out

out knots, larger at the lower end than the upper. The lower end should be cased with iron, and a two fanged fork at the end of it, as in the former. Then from B to C, should be bored holes about five inches asunder through the beam, for a bolt or iron pin to go through, which might be shifted at pleasure.

D, SHOULD be a strong ring of iron to slip backwards and forwards on the pole, as occasion requires; and to it should be strongly fastned a ring, with two or three links of chain at E, to play freely: and at the end of those links should be the jagged hook F, to lay hold of the bushes or plants, which will of it self take sufficient hold by means of the teeth, and acuteness of the bottom of the hook,

IN the using of this, the method is the same as the former, except only that when we have with this taken hold of a plant, we may raise the collar D, so as to make it tight. A man being a little used to this work, will very well earn his day's pay in drawing of bushes, but especially of quick, for fencing, which is the way practised in Essex, rather than to have the plants out of a nursery: but I shall say more of this when I come to treat of inclosing of grounds. We may observe that Mr. Mortimer's instrument is chiefly for drawing of broom or such

such like ; but the Colonel's is for drawing of great bushes.

IN the next place Mr. Fitz Herbarde, tells us that this land when it is cleansed of bushes, must be ploughed and sown, and improved by marle, especially if there has been a marle-pit before in the same field ; for as he well observes, that would be an indication that it was once of use, and might again be used, especially since the field we speak of, was heretofore arable land ; so that where a marle-pit happens to be found, he concludes that marle will be a proper manure for that land : but I have already treated so fully of soils, and manures proper for every one of them, that I shall advise my reader to look into that chapter for instructions what manure is most proper for the ground which he happens to meet with. In fine, it must be observed that such land as we have cleared of the troublesome bushes, must be prepared first for corn, which it should bear as long as it will with spirit, and then be laid down with grass. As to the particular sorts of grass for improving of land, it will be my business to speak of them in another part of this work. As to what my old gentleman speaks of mending of lands with mole-hills, it is now practised by all good understanding farmers, for they always consist of fine fresh earth. The way

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way of cutting them up may be seen in the chapter of ploughing ; and the method of spreading them upon land, should be with a harrow, made of white-thorn bushes, with a good weight upon them, which will spread them much better than a common harrow with iron teeth.

My author with a great deal of good reason, tells us that marle is much better than dung, for marle in it self is a fruitful soil, which for many ages has not been employed, and coming thus fresh from the pit, must of necessity be very productive, especially when its binding parts are opened and corrected by the light soil which it ought to be lain upon ; and we may observe likewise that as this earth is natural, so it will not breed distempers in the corn, or other herbs, which are sowed upon it ; whereas dung as it is commonly used, will certainly breed the fly, and I am almost convinced is the occasion of the mildew and smut in wheat, notwithstanding I find by the assistance of the microscope, that both these distempers in corn are accompanied with very small insects ; yet as I have observed in some of my other works, no insect will infect any plant, unless it is in such a state as to become a proper nest or nidus for them to lay their eggs upon, and that state happens commonly to proceed from some distemper

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temper in the plant, which for the most part proceeds from unwholesome diet. But I shall have occasion to say more of this, when I treat of the distempers in trees and other vegetables.

WHAT Mr. Fitz Herbarde mentions concerning the causes why tenants do not generally improve their lands to so high a pitch as they might do, I think he gives good reasons for, when a landlord happens to be over rigorous with a tenant, it discourages him from doing the farm any lasting good; and therefore to make sure of his own interest, the ground is tired out with crops, and the estate so impoverished, that at the expiration of his lease, perhaps five hundred pounds will not repair the damage, though the estate was rented but at one hundred pounds per ann. and this loss must then fall upon the landlord; for no tenant will then pay so much for it as it was rented for before; and either the landlord must lower his rent, or allow the new tenant as much money as will repair the damages.

NEITHER is it good management to let a farm by the year, as some have done, for the tenant will surely make the best of it for his own profit, fearing that he shall be turned out at the year's end, and therefore it is not worth his while to lay out any money,

ney, or be at any trouble to improve the land, being he cannot foresee who will reap the profit of it, and being pretty sure at the same time, that his landlord will not allow him a penny towards any improvement which he might make. And then again, if a tenant happens to possess a farm upon the life of any person, the case is much the same; for as long as he has no time certain, it is his care only to profit himself as much as possibly he can by all means and ways he can think on, though the estate be racked and ruined by his practices. For these reasons a landlord as well as a tenant, ought to be strictly bound to one another; and by the by, I may observe, that every tenant ought to be well apprised whether his landlord has a full power to grant a lease of a farm, before he takes it; for I have known very bad consequences that have attended uncertain leases, particularly in one instance; Colonel Bradbury of Wicken-Hall, in the county of Essex, (the same gentleman I have so often had occasion to mention in this work) took a lease many years ago, of Amberton-Hall, in the parish of Depden, with the farm belonging to it, in the same county, of a lady, who he had judged had full power of granting it for a term of eighteen years, though

though the estate was then much out of repair, yet the length of the lease gave him occasion to employ his talent towards its improvement; and he had courage enough to lay out near two thousand pounds upon it, when to his great mortification, he found that the lady he had taken the lease of, had not a sufficient power to grant it, for the term he had taken it for; and he was violently turned out, without the least allowance for the improvements he had made, although the estate was afterwards sold according to the rate of above one hundred pounds per an. more than what the Colonel rented it at: but the case was thought so hard, by all the country on the Colonel's side, that it has occasioned a suit of law, which has already lasted two and twenty years, and is not yet determined. How necessary is it therefore that a tenant be well satisfied of a landlord's power, before he takes a lease? and on the other hand, if he is imposed upon, how reasonable is it that he should have satisfaction in such a case; for the money he has laid out? and yet though he has this amends made him, still he must be a loser, because the profit which such improvements would have brought in, would undoubtedly have been of vast advantage if they had been followed in the exact method they were designed.

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NEITHER would I advise any tenant to go to work upon a farm with a bare promise of a lease ; for however we know that a promise is kept sacred in the city of London, among merchants, whose interests depend upon the due execution of their promises, yet when we come out of that verge, it is not always that we can meet a man of his word. I have known many sufferers, and have been a sufferer myself, by laying out money upon promises, notwithstanding the promising parties were covered with a good appearance, and had a good shew of justice in their front. Many a farmer has been ruined by laying out his whole stock upon a farm, before he was secure of a lease from his landlord ; for if interest falls in the way, or death happens, he may chance to loose his point : there are instances enough of such cases.

BUT on the other hand, a landlord ought to be as cautious how he lets a farm ; for unless a farmer has a sufficiency to stock a farm thoroughly, the landlord and the farm too must suffer ; for every thing may happen to be rent and worn out, and the richness of the land exhausted, and then the tenant and the rent to seek, and the land left in a ruinous condition, to the great damage of the landlord. While on the contrary, if a tenant is capacitated to stock a
farm

farm well, it is his interest to do it ; and a farm when it is stocked, as it ought to be, cannot fail to pay both the farmer and the landlord ; and where there is a good stock upon a farm, a landlord is always secure, though the tenant happens to fail.

WHERE a gentleman happens to have a good opinion of a farmer, and that farmer has not substance enough to stock a farm of himself, it would be better for the gentleman to lend him money, in order to stock his farm completely, than to let it lye idle ; for a farm that lies any time uncultivated, falls so much to ruin, that sometimes two or three years labour cannot recover it : nay, sometimes the damages are never to be recovered. Where there are woods especially, I have known great damages committed by stragling people and country libertines, who take all for their own that they can get in secret : but the greatest mischief is, they spoil more than they rob ; for to save the trouble of stooping, they leave trees cut off a yard above the ground, and cut their fuel or wood for other uses, in such a haggling manner, that what they leave, will never after recover themselves ; and then besides, every thing being left, without an overseer, the hedges and fences are destroyed, and thorns and weeds take such possession of the ground, as will require a vast

deal of skill and labour to root them out ; and in the mean time, the land if it happens to be of a heavy stiff kind, settles and closes it self in such sort, as many ploughings will not bring in order. I have seen many grievous fights of this kind ; especially where the titles of such estates were not settled, and where there has been tedious law-suits about them. I have often thought that it would be beneficial if there was erected some office which should have the care of such estates, and that should have power to employ people upon them for their welfare : so that when the title came to be determined, the heir, or true landlord of them, might come into possession with satisfaction, without being liable to the vast expences which commonly attend the putting a ruined estate into order ; but in lieu of that, to receive an account from such an office, as I mention, of all receipts and payments that have been made during the time of the law-suit : or for want of such an office, the contending parties might chuse proper persons as trustees, to keep the estates in good order, till the right was settled. It would be much the better for the person that got it, as well as for him that lost it ; for the gainer would come into his estate in good condition, without expence for repairs, and the loser would be quit

quit from paying the rent for so many years, as it would otherwise have lain uncultivated.

THERE is another thing which I think proper enough to mention, concerning the letting of leases of farms. Some gentlemen pin down their tenants to lay a certain number of loads of chalk, or marle, or lime, upon every acre of ground, which they allow the farmers a sufficient sum of money for, out of their rent. And in large farms I have known two or three years rent allowed on such an account; but I think this not for the welfare either of the landlord or the tenant, unless there is good judgement first had, whether marle, or chalk, or lime, is a proper manure for the land, either all or a part; for the marle is good in one case, as it is bad in another; and so the same may be said of chalk and of lime. And moreover, it is pretty certain that the nature of land will vary very much in the compass of an hundred or two hundred of acres; and then we may be sure, that the manure ought to vary likewise, or else one part must be impoverished, while the other is improved. Even dung, which is so much stickled for by the farmers and gardners, is not helpful upon all grounds; for the light lands, it entirely ruins, even though it is in its most useful state, which is where it is reduced to

earth. But my chapter of manures, will better explain this particular.

IN the making of leases, it might be of service to the landlord, to insert a clause whereby, upon the discovery of any mine, or mineral, even of gravel, sand, or brick-earth, he might have free liberty to come upon such lands, with his carts or waggons, &c. allowing the tenant such an abatement in his rent, as the land he employs may be worth by the year. I mention this, because I have known some gentlemen very uneasy when they have discovered mines and minerals, such as gravel, &c. and brick-earth upon their own estates; and for want of such a reserve in their leases, could not come at any of them, through the ill-nature or fordid pride of a tenant who possessed the land.

ANOTHER thing I recommend to the landlords when they let leases, which will tend to the increase of timber, which is an article as well for their own advantage, as for publick good; and that is that they oblige every tenant, in proportion to the quantity of ground he rents, to plant a certain number of forrest-trees every year, during the whole term of his lease; and not only engage the tenants to plant such a number yearly, but to pay at least ten shillings per tree, for every one that is wanting

ing of the number, at the expiration of his lease, which last article will oblige him to take care of the trees he plants : and if ill-minded people should happen to destroy or hurt any of them, the last act which was made for the preservation of timber and fruit-trees will secure him the money for the damage, without much trouble, seeing it must be levied by the parish where it was done, in case they do not discover the person.

WHAT Mr. Fitz-Herbarde says, concerning the idleness of some farmers, being one cause why lands are not improved, is a very just observation, and especially when he tells us that there are some who think it is enough to follow the steps of their forefathers. I know many of this sort, who languish in that way ; my father, say they, and his father before him, were topping farmers (but they perhaps lived in Somersetshire) and if I do as they did, I must be a good farmer too ; and these, it may be, live in Surry ; and so run hand over-head to grazing, which is the chief business of Somersetshire, and hardly live by it, because of the great difference there is between the cattle, and the feed of one place and the other : or if their forefathers were farmers of arable lands, in one of the Southernmost parts of England, and got money by their occupation ; these who would take

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a farm in the Northern parts, will follow the same method. How unreasonable is their judgement? is there nothing owing to soil and climate? they will find it to their cost.

BUT there is another set of men who will not harken to improvement, through a kind of opiniatrety, or stubbornness, they will go on in their own way, because they will. If I happen to talk with any of these, about improvement, they will ask me whether I can hold a plough, for in that they think the whole mystery of husbandry consists. These indeed may do well enough to keep even with their landlords, but that is all that can be expected from them. You must never hope to see an estate bettered by them, though the landlord would pay for it: nay, nor even though the farm were their own, there is no advising them, not though you produce them many examples. But I shall proceed to speak of the improvement of bushy ground, that never was arable.

C H A P.

C H A P. VIII.

Concerning the ordering of Busby ground, that never was arable.

THE bushes must first be cleared, as I have mentioned in the former chapter; and in the next place we come to the improvement of the land, which I shall first relate from Mr. Fitz-Herbarde, that we may the better judge of the British husbandry, how it is altered and improved since the time he writ of it in the year 1500.

We must consider what the ground is disposed unto, and whether it be dry or wette, or be disposed to bear woode or corne. If it be dry and full of grabell, it is better to bear woode than outhere (either) corne or grasse: if it be wette ground, it is not good for corne, but it will bear both woode and grasse; but if it be a black erthe, (earth) and dry, it is good for corne, and it will quyte (quit) the cost to stock it up by the roots, and to sow it with corne: and if it be white cley (clay) it is mooste commonly a wette ground, and then it is not good for corne, but it will beare both wood and grasse; and an acre of woode, is as good as an acre of corne ground, or of grasse;
and

and in some place moche better. And if ye will increase the said bushy ground, to make more woode, then between Michaelmas and Martlemas, ye must gather many ackbornes, (acorns) and put them in earthen pots, for those will keep them fresh; and in February and March, set the said ackbornes, in the said bushes as thick as ye will, and undoubted they will growe; and also ye may gette the keyes of ashes, nutts, and such othe, and sett them in lyke manner; and keep all manner of catell that will eat any woode out of the same ground, tyll it be past danger of catell.

My author gives us a good lesson in this chapter, concerning what ought to be the regard of a farmer, when he is about breaking up of ground; and though in some things I differ in opinion from him, yet his design being good, I think it convenient to insert it, as well as the other chapters of his, that we may have a full view of the husbandry of his times, by which we may be able to judge what improvements have been made, since he writ upon that subject. And especially I chuse this author, because I find that all the authors that have written since him, have taken a great part of their matter from him: that is, in a sort of progressive manner; Markham began, and the rest took from Markham, and so from one another;

ther; while all the while Mr. Fitz-Herbarde, has lain asleep, and has not been so much as taken notice of by Mr. Markham, who first copied from him: therefore I think it convenient to give Mr. Fitz-Herbarde, the freedom of speaking for himself. But I come now to examin what Mr. Fitz-Herbarde has observed to us in this chapter. If the ground be dry and gravelly, it is better for wood than corn, or grass; which arguing seems to be right for some sorts of wood, though not for all, if we were to plant it. But as our author recommends the raising of woods, by sowing or planting of mast and acorns, then indeed almost any tree will grow and come to some state of perfection, though perhaps not to be vast timber-trees, unless the soil be deep: however, as those woods are the most immediately profitable, which are cut as copice-wood, or for kids, or saggotting; the soil which my author speaks of, is certainly very proper, as one may observe in many woods in Hampshire, Surrey, and other counties. In this case every plant which is raised from the mast or seed, will be much stronger, and grow more vigorously than a plant that has been transplanted: because in the first place, the soil is natural to the plant that is raised from seed or mast; and on the other hand, it receives no check by losing of roots by removing,

moving, which all trees must do that are transplanted, though by the most careful hand : and again, if we transplant a tree from a soil which is of a different nature with that which we are to plant it in, it will be a long time before it will come to it self. But this I shall explain further, when I come to speak of trees. However it is necessary to observe that the way which Mr, F. H. prescribes of setting of acorns in or among the bushes, is a very good one, especially when we have a mind to raise some trees for timber, in our pasture grounds, where bushes happen to be ; for those bushes will shelter them till they grow up, and get strength enough to defend themselves from the insults of cattle. Upon most forests we may find instances of the same kind, which I suppose rather came there by accident than design ; for I do not find that any thing in those places is practised with design, relating to timber, but the cutting of it down upon every occasion, which I think is great pity, considering the great scarcity of timber now in England. But upon this foundation, I find between Abington and Oxford, there is a large tract of ground, with a great quantity of thriving young oaks upon it, that have been raised in this manner, by setting of acorns among furze-bushes ; some of the oaks being now, near
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twenty foot high : though as I am informed were not sown above ten years ago, that is, about the year 1716. From whence one may remark that the common opinion that plants growing thick together, rob one another of nourishment, is not always true ; and particularly we may be assured, from the foregoing case, that it is not so, if the plants that grow together are of different sorts ; for every sort of plant draws a distinct nourishment from the earth, and therefore one cannot rob another, unless it is of the same kind with it. So these furzes and the oaks, being different in their kind from one another, receive neither of them any injury by growing together ; nor will an oak thrive ever the worse for growing among white-thorns, black-thorns, or other bushes. And upon the same foot of reason it is, that a young nursery of trees, which Sir Henry Goodricke gave me an account of, prospered very well, without weeding, though the weeds were very high and thick about them ; but in such a case however, it is not prudent that they should be too closely encompassed with bushes or weeds, while they are very young ; because for want of air circulating freely, about the sides of them, they will tend altogether to shoot upwards to meet the air at top, and overshoot themselves, and become weak plants ; but when
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these masts or seeds are put in the ground among bushes, it is always to be understood that there will be air enough for the plants.

IN the next place we are to learn, that if the ground be inclining to wet or moisture, it is not good our author tells us, for corn, but will do well for wood and grass; especially the oak I find, of the timber-trees, will prosper well in it. I remember at an estate of Sir Charles Wager's near New-Market, in a little island, that was almost a bog, there were some oaks that made shoots in one year, above eight foot long: and that grass delights in moist ground, is evident from many thousand instances; and we find that grass is nearly a-kin to the water-plants; for what great varieties of grass do we find growing in the waters? and though the same places where they grow be laid dry, yet will they grow and flourish, without water; so that some of them are amphibious. The ever, or everlasting grass, by some called rey-grass, and rye-grass will grow in ponds and watery places, and also upon the land, where there are no waters. And there are also some others of the same liking, which I shall mention when I come to speak of grasses. However, all lands which are annoyed by waters, should be drained for the sake of cattle feeding upon them: yet nevertheless

nevertheless for those lands which will yet have a good share of moisture in them, notwithstanding the drains, we ought to provide such sorts of grasses for them as delight most in wet places. A catalogue of which I shall insert in this work, when I come to treat of the several sorts of grasses which are proper for the fodder or feed of cattle. But though I have mentioned the oak for a timber tree that will thrive in wet and moist lands; there are other sorts of trees, which will grow and prosper well upon such places, and turn to very good profit, such as the abele, or arbele, the black-poplar, the fallow white and gray, the willows of several kinds, oziers, alders, and such like; which will presently make woods in such wet lands as I speak of; for their chief delight is in watery places; and they are the quickest growers of all trees. And in four or five years time there may be good advantage made of some of them, which is the occasion of the old saying, That a willow will sooner buy an horse, than an oak will buy a saddle. And indeed any of the trees I have named above, will do the same; but then an oak when it comes to perfection of growth, or is fit to be cut for timber, will bring pounds when the others bring shillings. A good number of oaks have often saved an estate, and plantations of them can never be
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too much encouraged ; and indeed every sort of timber and profitable tree, should be promoted where there is ground fit for them ; for as long as they will bring mony, which is what every landlord aims at in an estate, I think one need not dispute whether it came by timber or corn, so long as it is produced upon the estate ; and it is very evident that all ground is not fit for corn, and therefore I much wonder that some farmers, when they find this, will yet work against the nature of that ground, and be at as much labour and expence as the ground is worth : nay, one may say that they make the ground quite new, only because it shall bear corn, as if nothing would bring mony but that : whereas if one was to cultivate such lands as were naturally against the production of corn, with such things as they would naturally support or nourish, we should save a vast expence, and yet reap a good profit : and I conceive that the general endeavour of the farmer, to fit all their ground for corn, is one reason why the culture of wood and timber is so little regarded ; and one would wonder it should be so neglected about places where the people are forced to fetch their firing ten or twelve miles, as they do at Salisbury, and yet there are several sorts of wood that would grow very well about that place, if any had
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courage to plant or raise it. The reason which I have for saying that the ground about Salisbury will bring good wood if it were planted there, is because I have seen good wood growing upon soils of the same sort. The black fallow would do excellently in such chalky grounds, and the beech and ash, as may be observed in Oxfordshire where the ground is chiefly chalk. In short, there is not any soil that some tree or other will not prosper in; but the gravelly soil is that which the greatest variety of trees will grow in, because such kind of land is not too stiff, but is open in its parts. But be sure to take care in all young woods to keep cattle out, till the trees are strong enough to resist them; for if they nip the top buds or shoots, the trees will hardly ever recover it.

BUT if the ground be black and dry, it is fit for corn, and will quit the cost to stock up the wood, if there is any on it; for the blackness of soil is a sure indication of its richness, except it be meer sand. But tho' a black soil be never so rich, yet if it lie wet, or be annoyed with water, it is not good for corn; for we find by experience, that if we suffer any water to lie on our corn lands, the corn will turn yellow, and be very apt to rot; therefore all farmers use the uttermost precaution to lay all the lands

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dry

dry that they sow corn upon. All wood-lands of this sort we find bring very good corn, or even tho' they in themselves are not quite so good as what we speak of; for the mixture of the rotted wood and leaves continually increasing in such woods, sufficiently manure the land for corn, when the woods are once cleared off the ground: But I have mentioned some instances of this in my chapter of manures.

BUT again, if such bushy lands we speak of are upon a white clay, which some call soft chalk, they are apt to be over-wet, and too stiff for corn, even tho' we drain them. Notwithstanding such white clay or soft chalk is used familiarly by most farmers to manure their corn lands, yet of it self is not proper, for the reason I have given before; but it will bear either wood or grass, or both together. We find very good woods upon this sort of land about Henly upon Thames, and in many places in Berkshire and Oxfordshire; and likewise good pasture-grounds, which they mend from time to time, with spreading earth over them about September, or in March, and harrowing it with bushes.

THE improvement which may be made for such sort of ground when it is laid down for grass, is to lay upon it in March the soil of streets within cities or great towns,
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or the parings and gatherings up of the high-ways, that have been much beaten by carriages and travellers; also the earth for two or three foot deep from under a dung-hill, for this is a very rich soil, and superior to any other : So likewise the black sandy soil, which is taken from heaths, is very good to spread upon such land ; I have seen very good grass by this means, where the ground was stiff and cold ; and for a further improvement of grass ground, if such bushy ground happens to be proper for it, see my chapter of manures.

C H A P. IX.

Of the Improvement of Furze, or Gorse, or Whin-ground.

WE have in many parts of England large tracts of land over-run with furze, gorse, or whins, which are all one sort of plant, but called by several names in different counties ; the smaller sort is accounted a weed, and a poisoner of land ; for tho' it will serve to brew and bake with, yet the trouble of cutting it, is rather more worth than the value of it when it is cut. But there is another large kind of furze call-

ed the French furze, which is much cultivated for firing in the West of England, and turns to good account. Yet notwithstanding this, we find in many places that even the large sort is thought unworthy the ground it grows on, but especially if it is not full crop, or grows in a scattering manner. Mr. Fitz-Herbarde on this occasion tells us as follows.

Ye shall understand that there be two manner of gorse, and some men call them fyze.

One manner will grow on drye ground, and that manner (sort) will grow as hygh (high) as a man, and have a great stalk as moche (much) as a walking staffe; and ye suffer (suffer) to grow and sell them not, by process of tyme when bestes (beasts or cattle) go among them, and specially in winter time for cold, or in summer for shade, that will cause them to dye (dye) and many tymes a long continuell frost in winter will kill these manner (sort) of gorse; and when they be dead, (dead) if ye plough the land and sow it with corn, when it lyeth by (lay or fallow) again, the gorse will grow again. And the best remedy for growing again is to put upon such manner of pasture many sheep to eat it bare; but in many places they see great store by these manner of gorse, and specially for their felwe, and would not give an acre of gorsy ground, for two acres of ara-

arable lande. And on that manner of goodly ground welde grow good corne with lyttel donge (little dung) and it is more profit to plough it and sow it, than to lye ley (fallow) except he keep it for his felwell; and they (the furze) grow most commonly upon drie grounde, somewhat sandy or gravelly; and shepe (sheep) is the most convenient cattell that may go upon such pasture.

If the ground be drie, and grow full of such manner of gorse with the great stalkes, ye be at your lybertie (liberty) to do as I have say'd; and yf it be the other manner of gorse or fyrle, the which grow lowe by the erthe (earth) and have but lytell (little) small stalkes; that maner of gorse groweth alway on well spring ground, somewhat moyste and wett, and it will never bear good corn, but hewe it up to bake and brew withall, for it will not lightly be destroy'd, for yf it be brende (burnt) it wyll grow again. But and there be marle underneth in the ground within the same close, yf ye make coe (if he think fit) then bren (burn) the gorse at March, and plow it and make small lands, and then merl them and sow them with ootes (oats) for that corn will grow best on suche ground; and if this will not serue, it is past remedy, &c.

THE great gorse or French furze, if it happen to be raised on purpose, must be always

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sown

sown upon dry ground; as we find in and about Devonshire, where I have seen it cultivated upon many large pieces of ground, perhaps forty, fifty or an hundred acres in a piece: Gravelly, sandy, or other light soils, if they hold tolerable deep, is proper for it. Tho' I have seen it grow upon a shallow surface, with a red rock underneath; but then it does not grow so tall as in the other grounds, nor of half the substance; and this for two reasons: For all plants that grow single, receiving the influence of the air on all sides equally, have a natural direction to grow on all sides; whereas those which happen to be defended, or shelter'd from the air on the sides, will push for an upright growth, and meeting the air on the top, while the sides are debarred from it, will run upwards without putting forth any collateral shoots; and in this manner I have seen of the French furze, about eight or ten foot high. But it is to be noted, that this, as well as the other sort of furze, delights to grow in an open exposure, and will not bear the shade, or drip of trees. This kind of furze, when it is grown to a good pitch, is cut down near the ground and faggotted up, and will burn immediately. The farmers in the West of England; where this plant is chiefly cultivated, sow several parcels of ground with this furze one year after another;

ther; and when one of them is grown to be five or six years old, they cut that, and so have a fresh piece for the year following, and for every year afterward: This produces a very hot and quick firing, and I conceive would yield excellent ashes for making of the pot-ash. The first two or three years it is very tender, and sheep and other cattle will browse upon it, especially when it is in its tender shoot. These suffer very much by cropping or bruising, and it is not uncommon to see large patches dye where cattle have been among them; but yet when we cut them up, they will sprout again, unless you design the land for corn; for I have seen very good crops upon such grounds in Devonshire where the French furze have grown; for it is to be noted, that the leaves of the furze are almost continually dying and dropping, and make excellent mold. For that part only of the furze which has the liberty of the air will be green, and the other which lies undermost will as certainly rot and decay; that is, the leaves and young shoots, for the stem will remain sound and perfect, increasing as the top grows. The method of sowing this furze is, to plough the ground, and sow it thinly; so that the plants when they come up may stand about a foot or fifteen inches asunder, and by that means they will grow

very tall. The season for this sowing is in March, and the seed should then be covered with a very light harrow, which will make the earth very fine; some therefore chuse to harrow it in with bushes. These, however, are somewhat tender, and apt to suffer by the frosts; for which reason I suppose it is that they prosper better in Devonshire, than in most parts of England; that county being situated in the warmest part of this island, even in so mild a climate, as to be out of the danger of lasting frosts, especially those parts which lie near the sea. I have seen this used for burning of bricks, to very good account; and it is the opinion of the West country brick-makers, that it is much preferable to wood. So that seeing it is of good use where it grows regularly, or is cultivated after the manner I speak of, it may turn to good account to be raised where firing is scarce. But as I observed before, there is a great deal of difference between an acre of ground cultivated purposely for furze, and a common or waste ground overgrown with it; for the latter is neither good pasture, nor will bring a crop that will pay the rent of the land. When this is the case it is best to destroy it, for as I have said before, the ground will bear excellent corn: to do this, cut up the furze close by the roots, and faggot it, and carry it home to be

be laid in a dry place, for the wet will presently rot it. This should be done in the spring about April, or as soon as it begins to shoot, and when the farmers have the most leisure; for then you ought to employ your men to stub up the roots as carefully as may be, that none of them remain in the ground; and when that is done, gather the roots together in small heaps about two foot over, and let them lie till they are well dried; then if the ground happen to be stiff, lay them in such a manner upon one another, that they may be a little hollow in the middle, and cover them with some of the same sort of earth they grew in, leaving an air-hole at the top, and another hole on the side wherein the fire must be put when the earth is pretty well dried, which will be in two or three days, if the weather be warm. When these hills are set on fire, be sure that you leave them thoroughly kindled, that the fire be not extinguished till all is burnt, which perhaps will not be in twenty four hours. This bate-burning, or batt-burning, is much used in the Western parts of England for stiff lands; but if the lands are light, burn the roots only, and lay them upon other lands; this is the same as Devonshireing. When the fires are quite out, let the clumps of burnt earth be broken as fine as may be with hacks or beetles, and
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the ashes and burnt earth spread upon the land as equally as possible before any rain fall upon it; for else the rain falling upon the ashes before they were spread, would wash the best of their riches into the earth, only where the hills were made, and then the produce of the ground would be unequal through the deficiency of the ashes that should afterwards be spread on other places: Which I have observed very apparently by the corn in some lands in Devonshire, when this has happened to be the case. I have also seen many young plants of furze come up about these hills in about ten days or a fortnight after they were burnt, which some of the farmers shewed me as an instance, that the furze grew from the ashes; and therefore they held that there is no destroying the furze, unless it be by feeding down the young seedling plants with sheep; but this is an error, for 'tis the seed of the furze which is bundled up in every hill, and such seeds as happen to have been brought or gathered with the surface that fall about the edges of the hill, that grow after they come to be covered by the mouldering down of the hills; for in the middle of the places where the hills were, I never saw any of these plants come up, nor can it be, except that in the spreading of the ashes, and tossing the earth about, some seeds hap-
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pen to be flung upon the very place where the hill stood, and then the ashes will certainly help the coming up of the seeds, as well as those ashes, and moldering parts of the hills which fall on the outsides of the hills, will cover and bring up the scattered seeds that fell there at the time the hills were made. Now we must understand, that the furze has no particular season for blossoming or bearing of seed, but we find some or other of it flowering and seeding in every month of the year; so that let us cut it when we will, there will be always some ripe seeds upon the plant: And besides, as it is always seeding, there must as surely be a great quantity of seeds upon the surface of the ground, which cannot come up or germinate till they are covered with earth; and in this case they are not only covered with earth, but with such sort as is the most nourishing and expeditious for their growth; i. e. ashes containing the fixed salts of the same plant: So that without having recourse to the old silly Rosicrucian opinion of bodies rising out of their own ashes, we ought to expect young plants of the furze to come up, where-ever we make such hills for burning of furze, and use such earth for them as furze have grown upon. While I am upon this head, I shall take notice, that ashes of vegetables or plants have been ap-
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proved to accelerate very much the germination or sprouting of seeds. I have tried them in many cases, especially in their first wetting, and have found that seeds have come up quicker by their assistance, than without them; tho' in the tryal, those which were sown without ashes, had the same degree of heat, and the same proportion of air and water; yet the mixture of ashes was always the quickest. While I am treating of ashes, and their use in vegetation, I think it may not be amiss to take notice how far this opinion has prevailed among a set of people who are fond of propagating the old story of raising a fallad while a shoulder of mutton is roasting, which depends chiefly upon ashes of plants. The secret I have tried, and I found it would not do; for tho' the ingredients are all agreeable to promote vegetation, yet in the attempt to accelerate the growth of seeds, there is nothing can form vegetation at this rate: For the powers to be used for such purposes, if they are above nature, will parch and destroy the seed, rather than make it sprout. And a man must have a very good knowledge of nature from extraordinary experience, to know what proportion of heat will drive a plant to the highest pitch of growth; that is so nice a point, that if we give but one degree in an hundred thousand more than will force a
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feed or plant to grow, that additional degree will destroy a plant: This is evident in the management of plants in hot beds, and the frequent failures in those cases demonstrate, that we have but few who have a reasonable thought that way, much less to know the certain degree of heat that is necessary to force a plant, the utmost in its growth. We must know too, that plants, as well as animals have naturally a gentle way of growth; and if we happen to put 'em beyond that, they become weak and sickly; and soon perish by over supplying the vessels too suddenly, and with such juices as are not nourishing. The feeds which I have observed, as well in the natural way, as in an artificial way, to appear the first above ground after sowing, are white mustard, cresses, and onions; the two last especially will bear steeping in warm milk and water, in which they will sprout, and even explain their seed leaves, not being subject to rot when they have nothing but water and milk to feed them, as many other seeds will do. This Summer, 1726, in June after a shower of rain, I sowed the seeds of cresses on a Saturday in the evening, at Stratford in Essex, in the natural ground; and on the Monday following in the morning at nine a clock, the cresses were above ground above half an inch, which was the quickest

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vegetation I have known without art. And even if we try cresses in an hot bed, we shall not have them sooner, if the bed be in the best order, unless they are first steeped in some liquor till they sprout, and then about twelve hours will explain or open their seed leaves, and bring them up, especially if the earth be very light; such as the ashes of vegetables prepared with some earth made of plants well rotted, and duly moistened, which will help their vegetation; and onion seed will also do the same, being steeped either in warm milk from the cow, or warm water. But still this is not raising of a fallad in two hours, or while a shoulder of mutton is roasting, nor can it be done, notwithstanding there was a merry paragraph in one of the news papers about two years since concerning a fallad raised in that time; but that I suppose was published with a double design, viz. to promote the interest of a particular gardener, and at the same time to banter another. The receipt for doing it is to steep the seeds in warm milk till they sprout, and then put them immediately into earth made of burnt moss, and rotted moss or straw mixed with the water from a dunghill, and then gently heated in a frying pan; but we must consider that the seed is growing while it is in the milk, or in warm water, and that time must

must pass for nothing in the case: And then as I have observed before, the common art of hot beds will not bring it under twelve hours, tho' we add to it the assistance of burnt moss, and the rotted parts of plants; but these methods, however, will help vegetation very much, tho' it will not perform what is promised by it in the receipt for the fallad. I wonder that notwithstanding the impossibility of the performing what the fallad receipt promises, we have yet people that pretend to it, and even of raising an oak from an acorn, to bear acorns in a few hours; but this invention I suppose was taken from the leger-de-main trick, so famous in the East and West-Indies, of raising a mango-tree with fruit upon it in two hours, from the stone of a mango being set in the ground, which the men of credit who have seen it know to be the effect only of slight of hand. But it is time I return to my business of improving gorsy or furze-ground, which I have already brought as far as the burning of the turf with the furze-roots, and spreading the ashes upon the land. We are then to plough the ground, which we have before supposed is dry and light; therefore as a good manure for it, if we design it for corn, we must lay upon it a good coat of marle, or clay, and with hacks break the clods fine, and sow it with wheat, and it will

will bear afterwards good corn of any sort without any other manure for many years; if between whiles the crops are changed; and now and then relieved with pease, turnips, beans, &c. which draw a quite different nourishment than corn: But the farmers will sometimes let the ground lie fallow after the first crop, and then some seeds of the gorze, which before were ploughed in, will come up; but as they are very tender the first year, if you then turn in sheep upon them, they will presently destroy them; so that they will appear no more; but I have seen good corn upon such ground, without either marle, or other manure laid upon it, except only the ashes, and the burnt earth; and by that means the land continued a long time fertile, for the furzes don't draw the same nourishment as corn.

BUT the land which is annoyed with the smaller kind of furze, is commonly wet, and therefore must first be drained; and after that the small furze burnt, with some of the surface of the earth, and the ashes being well spread, you may, if the ground be any ways stiff, lay on a good quantity of sharp sand, or black heathy soil, and plough it, and sow it with oats, for the first year; or if it be stiff, it may also be limed, or have any of the manures laid upon it that are mentioned in my chapter of manures for stiff
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and this, when it has born corn as long as it can without more than the first manuring, may be laid down for grass, and become very good pasture.

WE may observe that the large French-furze, may be killed by cutting the woody stalks within half a foot of the root in summer time ; for it will not then spring again, like the small wild-fuze or whins, by which name Mr. Markham distinguishes the small furze from the large sort.

C H A P. X.

Of the improvement of ground which is over-run with Broom, and the use of Broom.

THE land which is over-grown with broom, is accounted one of the worst sorts of land for improvement; that is, this is the general voice of the people ; but according to my judgement, it may as well be remedied and brought to be valuable land, as any other, seeing that our country affords so great variety of manures, if we would cultivate it for corn ; and also since we find by experience, as well of the ancients, as of the later writers and practitioners, that fresh earth is a sure amendment ; and that a light
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soil will always mend a heavy soil ; and on the contrary, a heavy or stiff soil, will mend a light soil ; but chiefly that there is not any sort of soil but will bear some profitable plant or other ; and as long as that is, I think a farmer well skilled in the nature of his lands, and of the plants that will thrive well upon them, cannot fail of considerable advantages. But I am to speak now of Broom-ground, and its improvement ; and shall begin with Mr. Fitz-Herbarde's sentiments of that particular : viz.

Brome groweth alwaye upon drie and sandy groundes, and it will beare good rye and otes, (oats) but it wyll not endure to beare corne long, without it be donged with the carte, or with the sheep-fold, or both ; and if ye lett it lye ley, (fallow) and plow it not, the brome (broom) will come again, and shepe is the best catel to hold it under ; but nevertheless it will grow. When it is grownen of a yerde of heyght or more, then it is good to bake and brewe with ; and specially when a house is thacked (thatched) to take the brome and make it in quarters of a yerde longe, or thereabouts, and pricke them into thacke by and by (close by one another) and cover the thacke cleene over, and it shall both keep out wet, and also save it from pullynge (pulling) downe with cowes, pyes, dalwes, and choughes : and if ye
would

would destroy it when it is grown three or four fote (foot) of height; then about Saint Jame's day, fall it a foot above the erth (earth) or more, and then the stalk wyllye for a good season; yf it be plowed, it will grow as fast as ever it dyd (did) when ye leave plowing (when it comes to lie fallow).

OUR author observes that broom grows upon dry and sandy ground, which we find to be so in many examples: but it is also very frequent in gravelly soils, if they lye dry, though I have seen it also in some places, which lay a little moist; but one of them I find was sown purposely with broom-seed, for the shelter of game. Which I instance to shew that it will grow in places a little moist, as well as in the very dry ground: however, it is certain that dry gravelly and sandy ground is the most natural to it.

OF the broom we have two sorts which will grow freely in England; viz. the common sort of the fields, and the Spanish-broom, which till very lately has been only propagated and cultivated in the gardens; but at present some gentlemen have raised it in their fields, by my advice; and though they could never before have any profit by bees, they are now masters of weighty stocks; and also have begun to find the good effect of them for binding and working of baskets, for they produce long and tough wyths,

not to be worn or broken like wyths of willows or osiers. The bloom for flower of this sort, is also very beautiful and sweet, perfuming the air like orange flowers in May, which invite the bees and enrich them very greatly, so that their hives are full betimes in the summer. And considering the profit of honey and wax, where bees prosper, I think that whatever ground happens to be planted with such flowering plants, as give them a large share of nourishment, and afford them plenty of wax and honey; may be said to be valuable: for from the observations I have made of bees, and the manner of gathering their honey, one may reasonably conjecture that an acre of ground which is cultivated with such a rich flowering shrub, will bring such a return as will pay the rent, if it be an acre; provided the neighbouring parts do not keep many bees to rob our own stocks; for by a calculation, which one may justly enough make on the bees account, one may conclude that an acre of the Spanish-broom, will afford wax and honey enough for ten good stocks of bees; for this broom brings a vast quantity of flowers fertile both in honey and wax, and continue blowing a long time. And when a stock of bees have flowers to their liking, of which this is one of the chief, and have a large quantity of them, they will fill their

their hive both with wax and honey, in five or six weeks, if the weather will permit them to go abroad : but this hazard is no more than other crops are subject to, the weather having the management of all crops, either for their well or ill fare. But let us suppose that among our bees, only five stocks reap the benefit of such a crop ; we will rate the wax and honey of each hive to weigh fifty pounds, so that in all, there will be two hundred and fifty pounds of wax and honey ; and out of that, to go to the most, we will allow fifty pounds for drofs, or what will not be vendible at the markets, then there will remain two hundred pounds of wax and honey, which if we suppose is near divided in half, the wax will be worth about five pounds the hundred weight, or one hundred and twelve pounds weight, and the rest in honey, at four-pence a pound, which is but a moderate price, will bring in something more than twenty-nine shillings : so that the whole will be worth six pounds and upwards, if the wax be well tried, which is a good benefit, considering there is no trouble nor expence ; for the use of wyths and plants, for thatching, will pay for the time of the growth. But this might be reckoned at a much higher rate ; for it is rare that a hive is thought worth taking, unless it weighs near four-score pound weight ; and good honey will sell for more than four-pence a

pound : and besides, the mead which may be made of the offalls, will be of some value. So likewise I might have observed before, that the furze is an excellent plant for bees, as it blossoms all the year about ; and the heath or ling likewise is very profitable to bees, for filling their hives towards the end of the year. But the common broom is no way comparable to the Spanish-broom for flower, no more than its wyths may be compared with it ; for they are not half so long, nor near so strong as the Spanish sort : however they are both useful for the sake of their wyths, for binding and for making of dry-hedges, and for thatching, being exceeding tough, and of long duration. This small sort of broom, which for distinction sake, we call the English-broom, is however placed among the weeds, which annoy the farmer ; and therefore many ways have been invented for the destruction of it in such fields as are over-run with it ; which lands are hardly allowed to be pasture for any cattle, except a few sheep ; and then only when it does not grow very thick, for the drip of it is bitter, and spoils the grass.

FOR drawing up this broom by the roots, the hook, which is Figure 1 in the Vth plate, is used with good profit, and is the work of one man, which may be seen in my chapter of the amendment of bushy-ground.

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This is an easy and sure way of drawing the plants out of the earth ; but the broom will spring again, after it is done ; partly because the seeds which drop from the broom, will be covered with earth, upon the tearing up of the broom, and will then come up ; and partly because some of the roots of this kind of broom, which are knotted in the ground, will break in the pulling up of the plants, and spring afresh. So that what we may expect from the seeds, and the remaining roots, will soon store the ground again plentifully ; but the young seedling plants the first year, are easily destroyed, for then the cattle will eat them, if the ground is still left for pasture : or the ploughing of the land in the summer, soon after the young plants are come up, will do the same.

BUT the best way of doing the work effectually in destroying of broom, is to cut it down into the hard woody part at the time when it is most vigorous in its growth : this has often been experienced, as well in the broom, as in other plants. And this way of cutting down plants, while the sap is flowing, will even destroy the twitch-grass, or couch-grass, and the bear-bind, which are the greatest plagues to the gardeners, and of bad consequence to the farmers ; for the least bits of their roots, will grow even if they

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lye upon the surface of the ground, and the ground happens to be a little moist. But the only way, as I observed above, for the destruction of plants, is to cut them down while they are in their vigour of growth ; for then the circulation of the juices is stopped, and consequently the plant must die in all its parts, even in the roots as well as the branches : but then we must be sure in this work, that we leave none of the growing shoots, even one of them ; for as long as that remains, it affords passages for the sap to move in, and will keep up the circulation, so as to preserve the plant alive, although not in great prosperity ; for the greatest part of the juices cannot be admitted, and therefore are lost ; and by that means the plant will grow weak : for it is a certain rule, that if we cut a plant while the juices are vigorously flowering in it, so in proportion to our cutting of the top, the parts under ground will decay. For these reasons, the cutting of the broom into the woody part, while it is shooting, will infallibly destroy the roots, and free the ground ever after from broom, unless what will grow from the scattered seeds, which either feeding in the summer, or a summer ploughing, will surely destroy : so that then our ground will be fit for use. But it remains that I should say something of the stumps which remain in the ground

ground after cutting. These must remain till July at least, before they are taken up ; for by that time, the life of the roots will be utterly destroyed, by the abundance of the sap, which will grow stagnant in them, after the circulation is stoped, by cutting off the tops: so that when these roots are grubbed up, none of the parts can ever grow again, which they would do if the plants were to be pulled up without cutting ; for then the broken parts which remained in the ground, being fresh, and having lively sap in them, would sprout immediately. The dead stumps of the broom should be taken out with picks or forks, and must be carried off the ground to assist in burning or devonshireing of stiff wet land ; for they will do damage to be burnt upon the broomy-land, which of it self, is generally dry and light enough ; and is therefore in the summer apt to scorch or burn, as the farmers term it ; that is, through its natural lightness and openness of parts, the summer-sun presently exhales the watery parts from it, and then the nourishing parts remain unactive (if there are any nourishing parts in the earth, when it is void of water) and by the quick exhalation of watery parts from this land, it is, that when corn or other such like body comes to be sowed upon it, the corn or such plant suffers in dry weather, and ripens before it is half

half grown ; so that it answers little more than half a crop : so therefore a dripping year is good for such lands. But for grass, if this sort of ground happens to be laid down with it, it will be of poor profit ; for the spire of the grass will be very short and narrow, and in the wettest season, produce but little quantity. We may indeed reasonably judge, and by experience confirm that such grass however, is very nourishing to all kinds of cattle that can feed upon it ; witness the cows about Awborn-Chase, that feed in many places upon such fine grass, though they do not give half so much milk at a meal, as the cows do that feed in the vales, in high grass ; yet their milk is richer, and will yield twice as much cream as the milk of the the vale cows : but then we must consider too, that much more ground must be allowed for the feed of a cow in this short grass, than where the grass is more plentiful : but sheep will be the best cattle to feed upon this sort of ground, and will thrive upon it ; for they love short grass, and bite close. By this sort of feed, their flesh will be fine grained and short, such as is the flesh of the mutton fed upon Bagshot-Heath and Bansted-Downs, which is esteemed the sweetest mutton in England.

BUT we are to examine what is to be done with this land in point of manuring.
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Mr. Fitz-Herbardetells us that we must dung it, or put our sheep in folds upon it. This way, I doubt not, was practised in his time, and is to this day, held as a rule among some farmers, who know little of the difference of soils ; and Mr. Markham tells us, that the ground will bear corn three or four years ; all which I believe : but I am satisfied by this sort of manuring and practice, the ground must of necessity, be soon worn out for corn, for the continual drawing of the juices of the best or strongest land by corn, must certainly expend those juices which are natural to corn ; but the ground, though it will bear corn for two or three years, if the seasons are favourable ; yet this sort of land is much more proper for other things, as especially will be set down in my chapter of the improvement of such land by plants, as are most natural to it.

BUT it is my advice, where such land happens to be very light, and we would till it for corn, that we manure it with clay or marle, in proportion to the lightness of it, and not to be too sparing when we are about it, but do it thoroughly, that it may last : and this is certainly the cheapest way, for though it will be a little expensive at first, yet the goodness of the crops afterward, will soon make amends. By this means the ground will keep in good heart for many years, without

out wanting any repairs, especially if the farmer once comes to be sensible of the great advantage which may be gained by shifting of crops ; which I take to be one of the most important branches of husbandry. For by a right knowledge of it, the spirit of the land will always be kept up ; every particular kind of crop, drawing a particular kind of nourishment from the earth : while in the mean time those virtues which have been employed in the nourishing of former crops, will recruit their loss from the rain and air, as often as the earth is opened to receive them ; which will be pretty frequent in the method I mention, because the land will never lye idle, but always be cropping with something or other ; and the more frequent land is ploughed, the finer it will be, and likewise will not be subject to bind, while crops are growing upon it, as it will do when it lies fallow. And we may likewise add, that the ground will be much enriched by the roots and other parts of plants, which will rot in it from time to time, of the various crops which it will bear. But this I shall further explain in my chapter concerning the amendment of land, by changing of crops.

BUT if these lands should happen to be heavier or stiffer than what I have supposed the broomy grounds generally are ; we must

must correct their over-stiffness, with sharp sand, heathy soil, or others, which are commonly light ; or such land may be mended by such other manures, either simple or compound, as are mentioned in my chapters of manures.

C H A P. XI.

Of the improvement of Heath-ground, and Fern or Brake-ground.

I N my travels about England, I have observed more grounds over-grown with heath, than any other unprofitable weed ; and that is the only sort of soil which hitherto the improvement has been unattempted, although in it self it is much more capable of bringing good profitable crops, than many other kinds of ground that have been cultivated. But the common opinion prevailing, that this kind of ground will not bring good corn, I suppose has been the reason why those lands have been neglected ; for commonly nothing else is thought on but the production of corn, unless it be in a very few places : such as in some parts of Essex, the carroway and coriander, is raised and the cole-seed : and about Godlamin, in Surry,

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the licorise, and in a few other places, the buck-wheat, and in another the woad ; and in the north of Essex, and in Cambridgeshire the saffron : but these, however profitable they are to the farmers that raise them, yet still they keep within their own bounds ; and it is very likely will spread no further, unless it be by the means I now cultivate ; I mean the writing of the several methods used in the culture of such things, that they may be spread into several parts ; and then I suppose we may find some who may have courage enough to venture upon such improvements of their lands, as they can have demonstration before-hand, will bring them good profit ; and by that means I hope to see many lands that now lye idle, be brought into an advantageous way ; especially since there are now many thousand acres of this land in England, which do not yield the landlord six-pence in the year. The improvement, however, of such land, was thought of formerly : viz. about the year 1500, by Mr. Fitz-Herbarde, who gives us his opinion in the following words.

We shall understand that there be four manner of heiths (heath) groundes, heith growing upon gravels, and heith growing upon sande. These two manner of heith-groundes, wyll beare no manner of corne, without moche (much) donge or mucke ; for seldom is there any marle under that man-

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ner of heith. And in many countreys where plenty of lime-stone is, the husbandes do bren (burn) the lime-stones with wodde (wood) and sea-cole, and make lyme thereof, and do set it upon their landes, as they do their donge (dung), for lyme is hot of it self. The other two manners of heith, is heith growing upon white cley (clay) groundes; and heith growing upon black erth (earth) that lyeth lowe like marreys (marsh) ground; and underneath these two manner of ley-heith groundes, there lyeth most commonly marle: then bren (burn) the heith, and serche (seek) for the marle, and digg it up, and lay it thicke (thick) upon the ground, and sprede it, and then plow it and sowe it, and it is moche (much) better then outhere (either) lyme (lime) muck, or any manner of dong, and lenger (longer) it wyll last; and se (see) that there be no water standynge (standing) upon the sayd ground.

WE may here observe, that in Mr. Fitz-Herbarde's time, dung was as much admired by the farmers, as it is now a-days: and for the muck he mentions, that is, such as the mud out of ponds, and street dirt (the word muck, being still used in Lincolnshire for the same thing) the muck indeed we find is useful and improving to sandy heath-ground; and it is generally fat soil, and helps
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to confirm the sandy soil. Where heath grows, if the soil be sandy, it is commonly filled with roots, which soon rot when they come to be exposed to the air, and make good mould ; but still for the production of corn, it is proper to cover the sandy-heath ground with clay, or some loamy soil, which will strengthen it, and make it hold good many years, without other amendment : or if it is difficult to get clay or fat chalk, or such other soil as will bind this light earth, if it lyes near the sea, where fish is plenty, as in Devonshire and Cornwall, it may be well improved by fish, which being full of oil, will bind the sandy parts together, and make it become near the nature of clay, in proportion as the fish is laid upon it.

OR if fish is wanting, then we may cover it with a fat marle, which will be a means of binding it, and consequently of enriching it. But if none of these are to be had, then the sowing of turnips upon it, will greatly help its improvement, by drawing them when they are well grown, and laying them to rot, and then plowing them in. This indeed, will take up some time, but as long as it will answer the desired end, we can only charge the time at a trifling rate ; for the rent of the land would come to little besides the turnip feed, which will be like-

wife but of a small value, in comparison of the improvement made by it. And as for the ploughing and sowing of the ground with turnips, the expence is little more than a single fallowing of ground, and the ground will ever after be the better : especially if managed with skill in the changing and shifting of crops. Or in such ground, we may at once sow buck-wheat ; and after we have got the grain, we may chop the haulm, and manure the ground with it. This haulm, as it is full of viscous juice, will help to bind the sandy parts, and assist it as much as the ancients tell us their lupines will do.

Mr. HARTLIB, who generally writes very well of husbandry ; and so well indeed, that many authors have copied from him ; tells us, that the difference of the nature of land, may be found out, and thereby be fitted with an apt compost. This is certainly true, and in some points I shall follow him, tho' not in every thing. He says that sand in the summer is apt to burn much ; and there if you apply lime-ashes or pigeon's-dung, or any thing of the like hot and dry nature, there you poison it ; and also when the earth is not apt to burn with the heat of summer, there if you apply any other thing except lime, ashes, pigeons-dung, or other things of hot and dry nature, there you poison that also : for it is a foolish thing for

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a cook to put more salt into the pot when the pottage were too salt before, so is it as fond a trick in husbandry to add a compost to land, wherein that quality predominateth, which doth also predominate in the land ; for corn and seeds are as nice in their diet, as any lady in the world, and will not prosper nor draw the nourishment if it be never so little distastful ; and this is the cause, why so many times so little a quantity of compost doth work such wonderful effects by the exquisite adaption to the land or seed.

As for the first propositions of this author to adapt the manure to the land, and not laying on hot and dry manures upon hot and dry land ; every man of reason, if he has no experience in husbandry, may judge it to be right, and Mr. Hartlib's comparison of the cook, is a good example of it ; but experience puts it beyond doubt, that he is in the right. But in another place, he prescribes dung before any thing, for all manner of lands : but in our present use, where the land is light and dry, I have in my chapter of manures, as well as himself, in the former paragraph, told my reader how injurious such direct fumes are to one another. Now every one who knows what dung is, knows that when it is thoroughly digested and rotted, it makes a light dry earth ; but I suppose he means dung, when it is but half digested, as he seems to intimate, where he
says,

says, that he has found by experience, that where dung hath been laid upon heaps, upon fallowed land, and hath lain unspread for a month or six weeks ; and withal some store of rain hath fallen to carry down the chilus or juice of the dung into the earth there, though the dung was all removed in the spreading, from the place where the heap lay ; yet there grew more corn in a yard square of that ground, so fatned with the chilus or juice of the dung, than in three yards square where the dung was dispersed in the rest of the land.

HE further informs us that dung doth not enrich ground till it be putrified and turned into chilus; or aqua pinguis, or aqua viscosa ; and also that compost must be turned into such a nature and property, before it can produce great increase in the present crop.

WHEREFORE he says the best husbandry is to prepare earth and compost in such manner, that the nutritive virtue thereof may be assimilated into the corn; or else the husbandman is deprived of great part of his benefit, by reason that the rain and land-floods, carry away a great share of the chilus or juice of such dung as falleth out of the reach of the attractive virtue of the seed or plant ; and if any doubt it, let him fill some holes, wherein he has planted corn with such fat earth, and he shall find his en-
crease

crease doubled upon common barren field-land; and contrarywise, let him fill holes with common dung, and he shall find no such success.

WE may find by experience and reason, that Mr. Hartlib is not remote from the opinion I propagate: viz. that light earth being bound or strengthened with a viscous matter, will be mended in the highest degree, for his chilus means the same thing; and by that we may judge that the condition of the dung he uses, is such as I call half digested, that is, dung (I mean horse-dung or horse-litter) which will cut easily with a spade like paste, and is then to the touch like soap. In this state the dung has certainly a viscous or slippery quality in it, which by rain or any flux of water will be communicated to the ground it is laid on, and so will help a light sandy soil, and strengthen it. This is the case of such dung as I have employed for hot-beds, made in March, and cut for spreading upon land about five or six months after. But as I have observed before, raw dung, which is what Mr. Hartlib has mentioned, when it is laid upon land, is apt to breed the fly, which is the destruction of many crops: But if it was not for that reason, I could not help joining with him in another design, relating to the impregnating earth with the
juices

juices of dung, and giving it a fertile quality. For the chilus, when it happens to be in dung, will help to bind light land; but when dung is fallen into pure earth, it is light and open, and therefore cannot be agreeable to the soil I treat of, viz. a dry sandy land: though by its lightness of parts, when it is thoroughly digested, it would be good manure for stiff lands; but the fly still is to be considered.

BUT Mr. Hartlib tells us, with good reason, that a valuable manure may be made for land, by letting dung lie upon ground some time: but he directs more to be done than is in the compass of a common farmer, and therefore it is my business to advertise the reader, that his directions should only be followed in proportion to the quantity of dung or quantity of land that is required. He tells us,

LET an acre, or more or less of good arable earth, neither clay nor sand, but between both, be chosen in some apt place where dung is plentiful and cheap, then cover it with dung a foot thick, or thereabout, and then you may be at choice whether you will at six months end, shovel off all the dung, and carry the fatned earth upon such ground as wants manuring, or else to plough the dung and earth altogether, four or five times in a year's space, and carry all together to be used as a manure upon other grounds. The

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first is best for light open soils, and the latter for stiff soils. An acre of earth thus made fertile, will manure many acres ; but it will be difficult to get dung any where in such a large quantity. However, in proportion to the quantity of dung that we can get, we may use the above prescribed method, and we shall gain by it as many loads of earth, as we have loads of dung. But Mr. Hartlib directs, that the earth which the dung is to be laid upon, should be between sand and clay, which is the same I call loam or mother-earth. That earth of it self, is rich enough to bring good corn without help, and is excellent to lay upon sandy light soil, or to repair worn-out grounds.

BUT the sandy heath-grounds, in the vacancies between the heath, and upon some large plats, are commonly annoyed with fern or brakes. These take a very deep root in the ground, sometimes above a yard, and can no ways be destroyed, but by cutting it down as soon as it begins to sprout above ground, and repeating the same work two or three times the same summer ; which method being carefully followed, will certainly destroy it, as I have found by experience ; but the cutting of it when the stalks are full grown and hardened, will not hurt it. The work must be done while the sap is in its highest vigour.

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AGAIN, many of these heath-lands are annoyed with water : four or five, nay, ten or twenty acres, may perhaps be covered with water, by happening to lie a little lower than the rest. In such a case if the watery part happens to be so situated as to be within twenty or five and twenty miles of London, or other good market for fish, it will be worth our while to store it with carp and tench, and make a feeding pond of it ; and especially if it be near a navigable river, which will be very convenient for carrying the fish alive to the market, in well-boats, and turn to very good account : or else it may be remedied, if the water is not too deep, by digging a spit deep of the land about it, and filling it up, so that when it is filled, it may lye a little above the circumjacent lands, that all waters that would otherwise rest there, may have fall enough to run off. I have known this way practised with good profit ; and by being ordered with proper manure, such as I have recommended above, it will bear good corn, or of it self, good buck-wheat ; though with less expence it would bear more valuable crops to be cultivated with such things as are natural to it ; as carrots, parsnips, turnips, onions, madder, licorise, kidney-beans, saffron, and some other plants, which I shall

mention in my chapter relating to the improvement of land by natural crops.

BUT none of these improvements can be made, without first the ground be well fenced, which I shall direct how to do in my chapter of improvement of land by enclosures.

AS for the gravelly heath-ground, it requires much the same kind of treatment with the foregoing, only with this difference, that if the gravelly parts are mixt with parts of clay, as most red gravels are, or black gravels, then pure earth is the best manure for it to bring it to bear good corn, or the compost with the earth about it, from the pit mentioned in my chapter of composts: or marle would undoubtedly do very well for such lands as the foregoing, if it could be had near at hand; especially for the sandy land, or else a good fat chalk.

THE next is heath growing upon white clay, which Mr. Fitz-Herbarde tells us has commonly marle under it. This sort of soil is by no means proper to be marled, notwithstanding in his time, marle was looked upon as a sovereign improver of all lands. The white clay must be broken, and where sharp sand can be had, or sea-weeds rotted, or such other light and open bodies, either singly or altogether, they will be of great benefit to the land, and render it fit for corn
or

or any thing else, according to the proportion we lay of the light soils upon the heavy or stiff soil, such as the white clay we speak of. When I speak of proportioning this manure upon our present white clay, I mean the necessity of tempering our soil in different manners, as the plants which we design for it happen to be of different natures ; for some must have very light grounds to grow at all, and some stiffer than others, or they will not prosper ; for plants according to their kinds, will have a proper soil to grow in, or else we may expect our labour with them will be lost. Nay, some are so nice in their diet, that the soil we plant or sow them upon, must be exactly the same with the natural soil of their growth, or else they perish unavoidably. Of such is the tragorchis, and some other kinds of orchis, which will grow no where but upon a chalk fit to make lime of. The water-lilly will grow no where but in still waters, rushes in moist watery place, the cloud-berry no where but on the tops of the highest mountains, fern or brakes no where in prosperity, but in sandy deep soil, mistleto, no where but upon a tree or bush ; and many others which are as exact as these : so that whenever we see them fresh gathered, we may be sure of the soil or situation where they grew ; so when I say that sharp sand, &c. will temper

temper this white clay for corn, or any other plant, it is to be understood that with more or less of such a manure, the ground will be more or less adapted to receive the several kinds of plants that are to be put into it, by its being more or less open or pliant in its parts. It is for this reason, that what I call loam or mother-earth, which is the medium between sand and clay, is a soil that will entertain almost any sort of plant, because those plants which grow upon stiff soils, will still find some share of stiffness in the loam I speak of; and those that grow naturally in sandy grounds, will find in this loam, some sandy parts. So that as their roots are naturally disposed to seek their food in the ground, they cannot be much out of their way. This middle soil however, is best for wheat, as well as most sorts of corn; for notwithstanding several sorts of soils have in them several kinds of virtues, as the waters which pass through them demonstrate: yet however, we find that soils of all sorts, if any seed or plant will grow in them, have some nourishment in them, natural to that seed or plant: and as no soil whatever can have any power to make a plant sprout or grow, unless it has the freedom and benefit of the air and rain, or dew, as by the experiment of baked earth, may appear; then the loamy soil, I speak of, being very capable

pable of receiving an impression from the air, rain, and dews, must consequently be better furnished with vegetable virtues than stiff clays, which are too closely bound for air, rain, or dews, to make any great impression on them : and sand, though it easily imbibes such qualities from the air, rain, and dews ; yet it has not tenacity enough to hold it in a long series of dry weather, but loam or mother-earth, has its parts open enough to receive, and its parts binding enough to retain what it has got from being exhaled too quickly. But more of this may be best considered in my chapters of soils and of manures, which will, I hope, sufficiently inform my reader of the nature of earth.

IN Kent, where the heath-ground happens to be of this sort or near like to it, they burn the heath and turf to spread upon the land, and mix sea-sand and lime with it, which makes it a very durable soil for corn, flinging over this mixture a large share of dung, or rather as I may call it, rotted straw ; for the chief dung, as they call it, is made of straw, which they lay in the high-ways and places of publick resort, to be ground and mouldered ; and this as well as the other manures, are used by the Kentish husbandmen : for such soil being all light and opening, cannot fail of mending and improving such land, by bringing it into
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such a condition as my loam or mother-earth. This soil thus improv'd, we are told, will bear wheat three years successively; the fourth year barley, after the ground has been folded with sheep; and the fifth, sixth, and seventh years, will bring oats, and the eighth year pease, and after that the ground is laid down with grass. But this husbandry is not agreeable altogether with the practice of some farmers of my acquaintance, nor can I from reason allow it to be good; for when ground has had a crop of any sort upon it, it must be less capable of bringing a crop of the same sort the next year; and a crop of the same sort the third year, must be much weaker than that of the second, because all these crops draw the same sort of nourishment: But where ground is cropt every year for twenty years together, with crops of different sorts following one another, then the ground will be kept up in full spirit.

ABOUT Staffordshire, the heath-lands are commonly of the same stiff nature, and there it has been the practice of the farmers to cut up their heath with a breast-plough, and burn it with the turf; and then mix ashes with about seventy or eighty bushels of lime to an acre, which manure they plough under furrow, and sow the land with rye, allowing about two bushels of corn

corn to an acre, which will increase about three quarters, and then they give the land three fallowings, viz. one about October, another the beginning of February, and another in April. The ground thus prepared, they sow next with barley, which will also bring about three quarters upon an acre, or sometimes four: And after this the next crop is white pease, for which they only plough once in March; for sowing this crop, their allowance of seed is about three bushels for an acre. And after these they sow white oats, allowing only one ploughing for them in March; and then 'tis laid down with grass. By this method they might hold the ground to bear corn, or other profitable grain for many years, by reason of their changing of crops; and the fallowing the ground three times after the first crop of rye, helps not only to open it, but helps to rot the stubble and roots of the rye, so that it answers the end of dunging, and would then bring any sort of corn.

As for the other sort of heath-ground, which is much attended with water, it is commonly a black light soil when it is dry. This is such as we find upon moors where there are many boggs; the amendment of this must first be set about by draining, for without that nothing can be done. We must consider this very little worth, if worth any thing

thing when we take it in hand, for it is dangerous venturing any sort of cattle upon it, even in the dryest season; for as long as there are any boggs open, all cattle that happen to be turned upon it run the hazard of their lives: So that I say such land can be of very little profit, and therefore what we lay out upon it for improvement, stands in the room of purchase-money, 'tis like buying of land. As for the draining part, see concerning that in my VIth chapter of the draining of lands; but to what is there mentioned I may add, that when we are about making our trenches, we should so dispose all the inclosures we design to make, in such a manner, that they may be high in the middle, or rise higher in some part than in another, for the better carrying off the wet into the trenches; and if there is marle to be had, it will very much help this soil to be laid in a good thickness upon it. Such lands are raised at the easiest rate, by taking some of the ground from that which we design the lower side, and carrying it to that which we design for the upper part; and tho' in this we must be loosers of some part of our land, by sinking some part of it; yet we must consider it is only such land as was before useless, and therefore we lose nothing by it, unless a great number of barren acres are more valuable than a small-
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er number of rich acres, which become, or are made rich by a little loss of the barren acres.

BUT yet, these lower parts need not be quite unprofitable, because if they are cut deep enough to receive and hold large quantities of water, they will feed great numbers of fish; for waters upon such black land are very fatning and nourishing to carp, tench, and many othes kinds of fish. Or else we may plant such low places with osiers, willows, alders, and such like, which will soon become profitable, and will in time fill up the hollows, if they happen to be planted thick enough; or else such watery places may be set with reeds, which bring profitable crops, as I shall hereafter set forth.

C H A P. XII.

Of the Improvement of Chiltun Ground, flinty or dry Chalk, and of Lime-stone Ground.

I N my first chapter I have treated already of these sorts of ground, so far as is necessary to let my reader understand what sorts of soil they are; and my business now is

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is to give proper directions for their improvement, which I shall introduce with Mr. Fitz-Herbarde's account of them.

Chylturne groundes and flyntpe (flinty) grounde be light groundes and drye, and full of small stones, and chalk groundes is moche of the same nature, and they will weare and wash away with water; and therefore they wolde be donged (dunged) as the bromy and ferny groundes be, for marle is seldom found in these manner of groundes, and therefore if ye want shepe (sheep) and donge, they would lye ley (fallow) and rest them that they may mend with lying.

Lyme-stone groundes is very good, both for corn and grasse, and yet in some places there wyl moche (much) heith (heath) growe upon lyme-stone groundes, and that is long of ill husbandry; for and that heith were brenned (burnt) plowed and sowed, the first year with otes (oats) and then fallowed and sowed with wheat, ry (rye) and barley, and after with beames or pease; it will bear moche corn wpth lyster donge, and shall bear alway after the better grasse, and shepe is the best cattell that can go upon these groundes, and best they will amende the grasse, and kepe themselves from rot-tyng (the rot) and he that hath lyme-stone may brenn it with cole and wood, and make lyme, wherewith he may lyme his groundes,

grounde, and that will bring good coyne, or he may sell his tyme at his pleasure.

THE chiltun ground is generally a good foil of it self, but being full of stones, like bits of slate or slices or flakes of rocks, it is apt to burn; however the farmers that employ these grounds, are seldom fond of picking out these stones, because they judge that the stones shelter their winter corn from bad weather, and they suppose that by that time the sun has any great force in the spring, the corn will be high enough to prevent the sun's scorching of the earth, and so they suppose that they do no harm at all: But where these kind of stones lie thick, the corn must surely want nourishment from the hollownes which the turning of the stones in ploughing will occasion. And besides, this ground has commonly a very shallow staple, and for the most part a rock at the bottom. So that the best method of improving such land, is by laying a good coat of marle; tho' some still follow the practise of my author in dunging such ground, or folding sheep upon it: but by that practise they must not pretend to compare their crops with those that grow upon the lands that are of a more holding nature, for it is only adding fire to fire, to lay such drying materials upon ground that is dry and hot already. And in some of
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these sorts of land which have been marled, I have seen the crops as good almost as I have observed them in Hertfordshire, or the adjacent counties; and the stones help to set the corn at a due distance, and keep it from falling too thick, which in plain grounds, free from stones, the corn is apt to do much thicker and closer than it ought, by reason of the too great quantity of grain that the farmers generally sow upon an acre. For in all the corn lands that are sown with corn, if it be thick the straw is thin and weak by standing close together, and having the roots slenderly nourished; for I have observed above, that when plants grow so thick that they do not feed from the circumambient air, they must necessarily be weak, tho' they will grow taller than usual; and then at the same time their roots must have a much less share of nourishment than if the plants stood wider asunder. I remember near Aubourn in Wiltshire I saw a piece of wheat which was accounted one of the richest crops in the country, that was offered to be sold early in the foregoing spring for above five parts in six less than the tillage and seed cost, because it then appeared to be come up much thinner than any in the country about it; but it was plain, the reason of its goodness and strength was occasioned by its being sown so thin,
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and the plants coming up so distant from one another; as near as I could guess the plants stood about five inches asunder, rather more than less. But it may be necessary that I should say something of the easiest manner of discovering or finding out of marle, which must be allowed to be a good manure for light grounds, and far better than dung, unless it be in such a manner, and as I have set down from Mr. Hartlib.

FOR the discovery of marle, the readiest way is to try the ground with a borer, or great auger or wimble of iron made in joints, so as to receive many pieces or bits, one longer than another, and so to skrew or bore one after another into the ground, and to draw out the earth, till you find marle, which instrument will save great trouble in digging.

THE places where we may most reasonably expect to find marle, is said to be in the lowest parts of hilly countries, and in the highest parts of the low countries, upon the tops of small hills, or among the cliffs of hilly or mountainous places, which border upon great rivers, or in the borders or verges of barren sands; or else if it may be thought worth while, it may be dug for, and will be very likely met with under such sandy grounds, unless it happen to be stone, which is sometimes met with under such

grounds. In some places marle lies very deep, and in others very shallow, even no deeper than the spit of a spade, from which uncertainty the boring-iron is necessary. It was in the first days the practise to carry the marle from the pit with all imaginable speed to spread upon the ground, least any of its virtue should be lost; and when any of this work was to be done, all the lord's tenants, neighbours, and friends, assisted with their teams, as well as their persons and servants; and there was a kind of unanimous agreement between party and party to help one another, when ever the marling of ground was to be performed. This we find mentioned in most of the old authors, and I suppose their great love for marle has been the reason why so many gentlemen in our times compel their tenants to lay a certain number of loads of marle upon every acre of land, when they sign the leases of their farms, without considering whether the soil is proper for it or no, taking the draught of every new lease from the old ones; tho' they grant leases upon a new purchase where the land is of a quite different nature or kind from the land, where marle might be, or had been beneficial. From my own experience I observe, that the marle which is most fat and greasy, is a good manure for light, sandy, or gravelly soils; and that the
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forts of marle which are most dry and har-raky, as countrymen call it, may be laid upon the stiffer soils with some success; but sands, and other such light earths, do much better, and give the ground better crops.

THE chiltun ground, which I now treat of, is also called scory and scaley ground: This sort of land in Oxfordshire is pretty frequent, and there it is common for the husbandmen to manure it with old thatch and dung. These grounds are sometimes without any swarth or sword upon them, and of such kind the husbandmen make little account, thinking it a rule that they will bear nothing: But this is a great mistake, and many curious farmers have found it so as well as my self, who have tried it in many places, by trying many sorts of profitable seeds and grain, which I generally carry in my pocket for such experiments, and sow them on skirts, or in corners of such lands as are accounted sterile or barren, and by that means have had many opportunities of discovering the nature of soils, which otherwise would have lain always in the same uncultivated state. The sorts which I generally carry with me are of those kinds which are of the most marketable crops, as Woad, Weld, Caraway, Coriander, Canary-feed, Flax, and Hemp-feed, Turnips, Carrots, Trefoil, Lucarne, St. Foine,

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Onions, and such like, and have made good discoveries by them, by taking a tour over the same places at such times as I guessed they would shew themselves in their utmost strength and value; and by such discoveries have brought several gentlemen, as well as farmers, to cultivate such lands as would not otherwise have been attempted. It may be given for a rule, that in all such soils, if they have but a fleet or shallow staple of earth, which is commonly their case, then our manure for them should be of such a sort as will be lasting to raise the staple, such as marle, clay, and other holding earths for the chiltern, stoney, flinty and dry chalky lands, and sandy or such heathy ground as is light upon the heavier lands, because these earths will not sink and wear like dung; and if we do not lay such manures which would deepen the staple, but would use the staple of its natural depth, then sow such seeds or grain upon it, as will best suit the depth of the staple; for some plants run their roots very shallow, others deeper, and according to that appointment in nature, so the depth of the soil must be, or else our labour will be lost. So I advise marle, or other fat earth to be chosen for the manure for chiltern grounds, because it will raise the depth of the staple, and also will bind the light parts of the earth,

earth, and make it very fit for the production of corn, and other profitable crops of grain. But such ground, when it is manured with thatch, dung, and such like bodies, they commonly about Oxfordshire give it a winter fallowing, and then ploughing it the next spring, sow it with barley, and the year after it will bear pease; and the October following they sow it with wheat, or with maslin, which is wheat and rye together; and the spring after that they sow it again with barley, and then fallow and twy and tryfallow for wheat after that, and so it will hold many years for corn: And at last, if the ground be not too light or shallow, it may be laid down with clover, or with lucern, or medic-clover, which will last many years in good heart; or else with St. Foine, which also will greatly improve it. These lands likewise will bear good lentills, or tills, or tares, or vetches.

BUT as these kinds of lands are situate generally on the sides of hills, or between hills where the land-floods, or showers frequently come, or such as are called shoots of water; we may be in danger of having all our surface or staple to be washed away by them, unless we can make any security against them; and if that can be, then we may plough and sow with some security, for otherwise our staple would be apt to

wash off from the tops to the bottoms, and sometimes be quite carried off the lands, if water shoots happen to come very strong; so then such lands will do better to be planted with some sort of wood, which will grow in such sort of soil, of which there are many sorts, as I shall set down in my chapter of the plants natural to soils.

BUT in manuring of such soils, when the declivity of the hills are not in the way of very violent or suddain water shoots, but are only subject to common rains, there we may employ our ground for culture of corn, or other grain; but in the dunging or manuring of any lands that are thus situated, we must observe to lay the manures much thicker on the upper than in the lower parts, because by the washing of the rains, be they never so moderate, the manure which lies at top will be carried by degrees to the lower parts of the grounds, and enrich them, while the upper parts are weakened, and their staple is impaired; which is demonstrable enough in every piece of hilly ground, which any one may observe.

AGAIN it is to be observed, that tho' in pastures on the sides of hills, the soil on the top, by being shallower or fleetier than at the bottom, the grass is shorter at the upper than on the lower side, and is commonly esteemed of like value; but tho' the com-
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mon grafs will not be of any great account, yet if we fow upon fuch lands, either the St. Foine, or the lucern, or the medic-clovers, the growth of them will be fo much where they lay hold of the ground, as to furpafs above ten times what the common grafs would produce.

WHERE the grounds are flinty, and the foil with them lies a little moift, fome farmers, who I find have very beneficial crops and good experience, have the ftones picked off, and they tell me they find profit by it, becaufe the ground is cold at bottom, and the ftones are taken away to let in the fun; but thefe ftill complain, that when they have picked their lands clear of ftones, after the next ploughing they have as many as they had before, which is occafioned by the fleetnefs or fhallownefs of the ftaple or furface that makes the plough ftir up the fcaley parts of fome quarry underneath; now whether the quarry happens to be fo fITUATE as the ftone it produces, may yield more value than the crops that may be raifed upon the land that covers it, muft be judged by the owner, who will beft underftand the markets of his own country. But it muft be confidered, that tho' a quarry may raife money quickly upon the firft opening, yet a quarry of this fort, which confifts of loofe flake ftone, may lie very fhallow.

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shallow in the ground, as it does oftentimes, and then it may soon be worn out, unless we open the ground, and destroy its surface or staple for many rods; for I have seen some quarries of this kind that have not had a stratum of more than two foot thick: but I have also observed, that where the stones are very troublesome upon the surface, or in the staple by ploughing, the quarries have generally been deeper in stone; in the ploughing on the side of hills we shall find, where these quarries are near the surface of the ground, greater numbers of stones than in other parts: So that if we open the ground for a quarry, we may conclude, that the place we speak of that has the greatest number of stones about the surface or staple, is the part where we shall get at the quarry with the least trouble. But as I said before, it must be known whether the quarry or the land is the most valuable; for the quarry will wear out, or be finished, and there must be ground allowed for cart-ways, which may take up a great deal of room, which will always be a loss of ground, and should be always allowed and brought to ballance in the farming account. But these quarries may be sometimes free-stone, or lime-stone, and then they will turn to better account than the scaley stone; and either of these,
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however they may appear scaley near the surface of the earth, yet may in a proper depth be dug in solid blocks, if it may be of convenience; and if they prove to be so, the stone will hold of a great depth. The stone in the Island of Portland is one instance of the depth of such quarries, and for the others, there is no one who is acquainted with the nature of quarries of this kind, which are common enough in England, will dispute it.

It may not be amiss that I acquaint my reader, since I am to speak of lime-stone in this chapter, and have at this time the subject before me, to say what lime-stone is. Lime is such a body as is burned from a stone or shell, will calcine, and will remain in a white body after it has passed a violent fire, and will afterwards fall to pieces at the approach of wet, which I give the farmer in these terms, that he may the better know what I mean; upon the approach of water it fires or burns, and then it produces a violent heat at that time, yet soon afterwards it becomes cold; but it has then the quality of correcting the four juices of the earth, and by that means of destroying the too viscous powers which reign in clay ground, or sweetning the ground, as some say; tho' others talk of warming the ground by it, believing, that by flacking
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of it upon the ground, its firing there is an instance that where-ever it is spread, it must warm the ground it is laid upon. But I can easily demonstrate that it does not affect the ground with any extraordinary heat where it is laid upon land in heaps, at the time it is flacked, and much less when it is spread upon the ground; for allowing the lime to be an heap of fire when it is flacked, the ground under it feels it very little, or not at all; for fire ascends always, and as soon as the lime falls to pieces in the hills, or little jogs, where they are laid in heaps, the parts cool, and are never hot any more; but by the falling to pieces, the parts help to open a stiff soil, and at the same time abridge or lessen the viscous quality of it, which still is a means to open it, or make it fall to pieces; but if it is laid on in too great quantity upon land, it does not burn it, as the farmers say, but will make a mortar of the land, and so make it bind too hard in summer, and destroy their crops, which they call burning of crops. All these calcined materials ought to be used with abundance of discretion, for if we consider only what mortar is made of, we may easily imagine what will be the consequence of too much lime, viz. of binding extremely; and if we were to use any of these bodies (I speak to the farmers, not the physicians) to

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remedy the heart-burn, which is a distemper all the farmers know occasioned by a sowerness in the stomach; tho' a little of any of these will correct it, yet a large quantity of any one of them would be poisonous. So, tho' a little lime may be good to correct the sowerness of lands, yet a great deal of it quite destroys the ground: And tho' the common method is to lay seventy or eighty bushels of lime upon an acre, yet sometimes that is more than the land will bear; the best judgment that can be made, is by examining the stiffness or lightness of the soil, and to lay the greater quantity upon the stiffest soil, especially if it be wet and cold land; tho' as I said before, lime is not warm, as the farmers hold it to be, but by its crumbling and falling to pieces, it will help to open the clay, or stiff soil.

IN the North of Essex, upon the champion country, there are many of those grounds called chilturn, but in that quarter of the country it is called mawm, or malme; they differ little from those I have mentioned, the earth of these being loamy, but mixed with stones, as the former; here the farmers have good crops of corn, by manuring with dung and lime, or folding of sheep, and by the old method of fallowing: but these grounds do not bring crops every year, nor can they practise any other method

thod, because the grounds are not enclosed; for if one farmer was to sow his land when the others did not, the rest would turn in their sheep, and destroy his crop: So strangely are some of them possessed of their opinion, that tho' it is demonstrated to them that these grounds will bear good crops oftener than they now do, yet they are so fond of an old custom, that they rather choose to be losers, than go a step out of their old road, notwithstanding some skilful gentlemen of the country, as I have been informed, had agreed to crop their lands every year, but through the obstinacy of a few could not compass their designs. I know many instances of the like nature, where the stubbornness of a few people have prevented publick advantages, otherwise I am sensible that the produce of this nation would be much greater than it is; how many commons might be brought into valuable decorum, if it was not for one or two, it may be, in a parish, that are of such sordid dispositions, that they will neither allow themselves nor others, the advantage that might be made by enclosing of commons; such people, in my opinion, if their right of profit is not endangered, ought to be looked upon as mad men. However, I do not despair of seeing many large commons enclosed, since already we have an example

ple or two, and especially since it may be done to the advantage of the poor.

BUT we are to understand that the chalky ground here mentioned, as it is a dry scaly foil, so the management should be the same as for the chiltern and flinty ground; and as it has but a very shallow staple, its greatest improvement is by laying such manure upon it, as will raise the staple, and give it depth enough for bearing of corn: But for the method to be used to improve this land by natural crops, I shall mention that in my chapter of natural crops.

I COME now to consider the improvement of lime-stone ground, that is, such land almost as the foregoing chiltern, in point of being stoney; but the stones in this kind of ground are of the nature of marble, and will calcine to a very strong lime. There are many of these in Devonshire, whose foundation is a good loam, such as one would wish for in gardens; here it is worth while to pick up the stones for burning, for which end the gentlemen who have such land upon their estates, have most commonly lime-kilns of their own, and for the most part burn it with furze. This lime they lay upon their ground, after the rate of sixty bushels upon an acre, and about twice the quantity of cobb, if they can have it; which cobb is old mud walls made of
loam

loam and straw; or else they use dung well rotted with their lime. But this sort of soil I have never seen subject to heath or ling, as Mr. Fitz-Herbarde says; but as for the practise of sowing of grain upon them he is pretty right with the present practise, only the farmers sow white pease between whites, which does not only save but help the land, by giving the land a relief after their crops of corn; and they have told me that the first crop which they commonly put upon this land after breaking it up, is horse-beans, without waiting or taking the pains to bring it to a tilt, as it is called in Essex, and Hertfordshire. The manner of sowing their pease there, is the same as in other remote parts from London, not minding to sow them in rills or drills; for the drilling of pease is only useful where the pease are to be gathered green in the swads or shells; and therefore the sowing in drills or lines, about two foot and half asunder, is for the advantage of gathering them: But in Devonshire, and other places, where they sow pease for the sake of ripe hard seed, either for the feed of hogs, or for the use of shipping, they sow them broad-cast, which gains a great deal of ground, and they have vast crops; which if they sow them early, are time enough off the ground to be sowed with a crop of turnips the same year;

year. And as soon as the turnips are off, they sow barley ; and as soon as that is off, they plough it twice, and lay on dung and lime, and then sow it with wheat, and so continue by changing of their crops to keep the ground in heart for many years ; and at last laying it down for grass, with rye-grass and clover.

BUT if this ground happens to have a vein of flaked marble in it, there is very great profit made by burning it for lime ; for there is no better lime in the world, than the lime made of marble, which is called stone-lime ; but of stone-lime there are two or three sorts, some made of a kind of stone, not so close in its parts as marble ; but that lime is much less binding than marble-lime, tho' they look near alike. Yet in buildings, where it is of capital use, it soon discovers it self ; for one sort soon feels the effects of frosty weather, and moulders, while the other grows harder by length of time, and resists all weathers.

IF this ground happens to be over-run with heath, as we are told, it is sometimes, the most rational method to be taken with it to bring it into order, supposing that it is fenced in, is to clear the heath well from the outsides of the field, by cutting it to the ground, either with an old sythe, for about twenty foot from the hedg-

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es, or else cutting it up as wide with a breast-plough, and then laying of the heath or turf, somewhere within the field, out of the reach of the hedges or fences; for else when the fire is set to the heath, it will destroy them by singeing them just when they are in shoot; or it may be the burning heath may set them on fire, and then the burning of the young shoots is certain death, if it happens to be when they are in the vigour of their growth. Then after a long season of dry weather, as soon as you perceive a little wind stirring, set fire to the heath in several places, on the wind-side, with wisps of straw, and the whole field of heath will burn down; for when trees are in the vigour of their growth, and have their sap the most fluent, I mean the native trees of our country, then the heath is at a stand in its growth as one may judge, if there had been no observations to prove it, because heath blossoms at the latter end of the year. But if we have no fences about such ground, and we are to burn any certain quantity of heath, we must first be sure to trench the place round, and take care to cut down the heath about the place, and clear it of the cut heath, before we set it on fire; for while this is burning, if a wind happens to rise, all the heath country is in danger of being set on fire. In Sur-
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ry and in Devonshire, this has been often the occasion of a great deal of labour to stop such fires, through the inadvertency of the people, who had no regard to the compass of ground they had occasion to burn.

BUT there is another method which is prescribed by the old authors, which carries a good face of reason in it, which is to cut down the heath or ling, upon the ground you design to improve, as close as possible to the ground, or else plough it up with a breast-plough all over, and let it lye till it is thoroughly dry, and then burn the heath after it has lain a sufficient time to dry. The burning they tell us should be done with straw, setting fire of the heath at the corners, to burn into the middle of the ground; and after all is burnt and cooled, beat the surface over with beatles, so as to beat the ashes into the ground. Then take a strong plough with a broad winged share, and an even coulter, and plough the ground in large square furrows, without picking out any of the roots, though there appear never so many: then let this ploughed piece lye two or three days or more, till the roots dry, and then with hacks draw the roots with the earth about them together, and build them in hills, and with heath and straw, set them on fire to burn, till they are quite consumed to ashes, which will be soon done, if the earth be dry, because of the

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great quantity of roots that will be in it: then spread these hills of ashes over the ground, as equally as possible, and lay fresh earth upon it, if you can get it, or sharp sand, and some stiff earth in equal quantities, and it will raise the staple and enrich the ground to be fruitful for many years in corn. But it is necessary to take notice that after the first burning of the heath, the limestones should be picked up, that the land may plough afterwards more easy.

NOR is it necessary only to consider the enriching of such grounds, but also to consult their situation; which if they happen to lye upon hills, may often be exposed to the North, and have a very little share of sun. In such a case, if you sow any winter corn upon them, you should have your crop in the ground very early, as in September, about the end of the month, the latest that your corn may be up, and in good strength, before the severity of the winter comes on, that it might the better defend it self; for if we were to sow it late in the year, the most that would appear of it would be the acrospire or maiden shoot; and then the shank of the corn would be weak, and subject to perish, as well as the acrospire it self. But if we sow it early enough to gather strength before the winter comes on, then we may have reasonable hopes

hopes of good profit by it; for should the frost destroy the grass or leaf of the corn, yet if it has got good root, and the shank is strong, it will spring afresh, notwithstanding the leaves may happen to be killed, and by that means the corn will multiply in stalks and ears: but if corn happens to have the acrospire destroyed, it will never sprout again; for the acrospire in corn is like the seed leaves, or ear leaves in other plants, which serve to suckle the plant, if we may so say, till the roots are numerous enough, and have gained sufficient strength to draw in nourishment enough to feed the plant, without other assistance. But however, though I say that when corn has several leaves, and after those leaves are destroyed, it will spring afresh from the roots, yet it must not be supposed that I would have the corn strong before the frost, purposely to have the leaves destroyed, but only to be pinched by the frost; for by the pinching of them the corn will sling out many off-sets: but if the leaves are quite destroyed, however the roots may sling out off-sets, yet those off-sets will be weak or strong, in proportion to the degree of tenderness the corn is in, when the frost attacks it. So I advise the sowing of all corn early, but much earlier in places which lye remote from the sun; for should the corn happen

to be very rank or luxuriant, we may help it by feeding it with cattle, which by cropping the first shoots or leaves, will make it spread at the root, into many heads, just as we may observe when we top a large shoot or the top bud of a tree, we shall make it sling out many shoots on the sides. So I say that the sooner we sow our corn, the stronger it will be before the frosts come upon it ; and the stronger it is, the better will it be guarded against the frosts, and the stronger will be the shoots that spring from the root, if the top happens to be pinched, and then consequently the more corn it will bear, and be the better nourished.

WE have few winters in England, without frosts, sufficient to pinch the corn ; but if a mild winter should happen, without frosts enough, then feeding is absolutely necessary to make it spread, especially if the corn is not too thick ; for then by feeding it, the corn would become too thick, and run into thin straw, and bring weak ears.

BUT upon such lands as are exposed to the North, we may sow our summer corn later than in well exposed places, because in such places the ground will remain longer moist than in those grounds lying to the South ; and therefore will be longer in a condition of bringing up the grain, than the others, which will soon be too dry for sowing

ing when the sun begins to grow hot. And then again, the side which lies toward the North, ought to be sown later than the other, because it will not so soon find the sun's influence, notwithstanding the whole body of air, will in some measure, be warmed by the sun's approach, yet not enough on the North side, as to promote vegetation, or the growth of plants.

ON the North side of the Appenine mountains, the farmers sow their wheat and rye in March, and have very good crops ; but their corn is smaller than ours. I have sown some of the same in England, at the same season that they do there, and the wheat did very well, but the rye did not spread at the roots so much as I expected ; but the reason of that was because that was not cut down, but the wheat was mowed when it was about four inches high. But I shall say more of this when I come to speak of corn, and the sorts of it.

C H A P. XIII.

Concerning the improvement of land, by adapting to every sort of soil, such plants as are Natural to them ; and by that means saving the expence of Manure.

IN the undertaking of barren or other lands for improvement, there are two things necessary to be considered : The first is how we may render such lands beneficial with the least expence ; and in the next place we ought to know how to distinguish between one soil and another, and apply such plants to every one, as are natural to them.

As to the first we may be sure that all manures are expensive, and so is fallowing of land ; the use of which I have already treated of pretty largely in the chapter of manures. Those indeed are both necessary in such cases where we are obliged to fit our grounds to our crops : or if we wanted wheat, or barley, or oats, &c. and our ground was not naturally proper for them, we must then, by labour and expence, bring our grounds to suit with them ; but to avoid
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such expences we must fit our plants to the ground.

IN the next place we come to consider the difference between one soil and another. This I have explained in my first chapter, with a design of shewing their respective qualifications, in order to mend one with another ; as the heavy with the light, and the open with the stiff soil, so as to bring it to the purpose we design it. But in our present case, we are only to remark which is light, which is heavy, and which is wet and which dry. When we have all these kinds before us, let us search a little into the nature of plants. Some plants love a light soil, some a stiff soil : some will only prosper in wet grounds, others will only grow in dry grounds : these are the generals. Let us now descend to particulars.

THE profitable plants which we observe do well upon light ground, such as sand, and other the most open soils, are the saffron, crocus, the spurry, buck-wheat, turnip, kidney-bean, onions, madder, liquorice, carrot, parsnip, potatoe, everlasting-pea : and for trees and shrubs, the fir, the pine, the pinafter, the cedar of Lebanon, the hazle, the french-furze, and some others.

EXPERIENCE in the first place, teaches us that these prosper well in light ground, as every one may be satisfied if they take a
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view of the crops in the lighter ground, about Wandfor, and other parts of Surry, and other countries near London. But I likewise give my reasons why such plants prosper better in this light soil than in others. And these reasons depend partly upon the knowledge of the plants themselves, and their structure, and partly upon their uses. But before I enter upon these particulars, I am to observe that the light soils I now speak of, must not be oppress'd with water, for that will make a great difference.

WE must know first, that most of the plants before-mentioned, have durable or lasting roots, and sandy land will better preserve them from rotting in the winter than stiff soil: and besides this, in these open lands, the roots can run with greater liberty and freedom; for I observe that such kinds of roots as are bulbous or long like liquorice, are subject to spot and canker, if we plant them in stiff land; for the stiffer lands do not close so soon about the roots, but that some part of them are exposed to hollow places, which either harbour air or water, in too great proportion. And where this happens, such parts of the roots rot, and entice worms to them; but it is not so in sandy and light ground, which presently closes about the roots, and so they escape without either canker or rottenness. Besides
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this, the sandy soil is much drier in the winter than the heavy soil, and is more easily warmed by the sun : likewise this sort of soil is beneficial to all deep rooted plants in summer ; for the moisture about the fibres, at the bottom of the roots, is so deep below the surface, that the sun's heat does not dry it up ; and it is always the fibres which feed the whole plant with nourishment. We may observe likewise, that the stronger and more healthful the root is of any plant, so much the stronger will the plant be above ground ; and if we frequently cut and spoil the top of a plant, the root will as surely grow weak by it. The weakening of a plant however, is sometimes necessary to make it the more fruitful. These observations we shall find as necessary as they are true.

WE are in the next place to observe, that all deep rooted plants, require a deep soil ; if their roots will run two foot deep in the ground, the soil should not be less than two foot and half deep, because as I observed before, all the nourishment such plants receive, are by means of their fibres, which for the most part are at the bottom of the root. And now I come to enquire into the uses of the plants I have mentioned for sandy ground. The saffron-crocus, which is a bulbous root, requires but a shallow soil,
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because it is but a small round root; and the soil must be light, because we find that all bulbs are apt to rot in stiff soils; and they make the largest off-sets always in light soils. Again, the time when these roots are in their growing state, is in the wetter seasons, and therefore they are best preserved in sandy ground.

MADDER is also a proper plant for such light soil, because as the root is the only part which is useful in it, the light soil will especially encourage that part by giving it room to run and encrease easily: so the liquorice is only valuable for the sake of the root, and the larger the roots are, the more valuable the soil; for this should be very deep, because the roots run very long, but the soil for the madder need not be above a foot or a foot and half.

THE carrot is another deep rooted plant, and is valuable for the sake of the root as well as for the seed. This light dry soil is good for the benefit of the roots, because the root can easily run down into it, and gain good length and thickness: and besides, by the simplicity of the soil, they will be much sweeter for eating. But when we save seed from carrots, we need not then be so careful of the tenderness, or lightness, or dryness of the soil; for an ill shaped root, if the sort is originally good, will bring as valuable

valuable seed as the best shaped root that we can plant.

THE parsnip is valuable for the sake of its root, and covets this light dry soil for the same reason as the carrot: but when we plant roots for the sake of bringing seed, any ground which is not very stiff, will do.

THE Potatoe delights in such soil, that the roots which are the valuable parts of it, may have full liberty to run; but as they do not grow downright, so the soil need not be more than a foot deep. Here you will have more roots or tubers, than if it was planted in a stiff soil, but they will grow in such a soil.

THE turnip, whose root is chiefly the valuable part, is always best in sandy ground, because that is least subject to worms; and also such ground feeds it with sweet juices, whereas wet and stiff ground have more sower juices, and therefore they must immediately pass into the root without opportunity of purging or rectifying themselves, the roots must necessarily have an ill taste; but turnips will grow very large in stiff land, but are not then so good for the table. There are no sweeter in the world than those which grow about Godlamin, in Surry, which is in a light sandy part of the country. However, this root grows with the apple or head, above ground; yet it has always a shoot,
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which runs down and will sometimes descend with its fibres near a foot, in a tender soil. But there is one sort of turnip, whose root is shaped like a parsnip ; for this especially such light soil is good. It is to be observed that the apple-root of the turnip feeds largely from the air ; for unless the plants are laid open early to the air and sun, the roots will never be large, for this reason, the houghing of turnips, and other roots, is appointed.

THE everlasting pea is valuable for the fodder it would bring, if it was commonly cultivated. Its root is long and runs deep, therefore deep sand or light land is good for it ; for when such roots as run downright in the earth are obstructed in their growth, the whole plant suffers, and becomes weak. Such deep sandy soil is no less proper for the roots called goat's-beard, skirrets, scorzonera, and any other that has deep or running roots.

KIDNEY-BEANS, do very well upon sandy soil, for if the soil we sow them in is subject to hold wet, the beans will presently rot, and never come up, or when they are come up, if the ground is not tender and light, that the young fibres of the roots may have an easy passage into it, the stalk will presently decay ; and then the ear-leaves, and consequently the whole plant.

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This is experienced every year, where attempts have been made to raise them in stubborn soils ; and the prosperity may every year be observed in the light grounds, where they are planted.

PEASE will also grow very well in such light soil, and be very fruitful ; but a dry spring or dry summer is apt to make the pods short : however, there is no ground so good as this to sow winter pease to be early, fit for gathering ; for here they will not be subject to rot. The pea has a succulent and juicy stalk, which shews us that it receives a large share of nourishing moisture from the air ; and therefore requires a drier or lighter earth to grow in : for it is a certain rule that stiff, wet soil, is always injurious to those plants which are most juicy. We must however, consider, that the pea is valuable for its fruit.

IN this soil onions will prosper very well ; for they are very juicy, both in their leaves and bulbs. The roots of these are chiefly valuable ; and they are better tasted in the light simple soils, than when we sow them on others. But if we transplant the roots for seed, we may put them in stronger soils. As the bulbous part of the onion root, lies always above ground, so it is more subject to attract the air, and enlarge it self with that and the moisture of the dews.

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BUCK-WHEAT, is a seed very apt to rot in the earth, and in the ear likewise, while it is in the field, if the ground is stiff and wet ; and the whole plant being of a very juicy nature, therefore the light open soil I propose for it, is the most favourable to it. The seed is chiefly useful for feeding of cattle and poultry. This plant no more than onions, does not require a very deep soil, as one may know by the depth of their roots.

SPURREY, is also good for such land, but it is only a crop for eight or nine weeks. The seed is useful for feeding of poultry, and the whole plant is good fodder for cattle. This carries its root very shallow in the ground, so that it will grow well in a soil of the fleetest staple.

THE fir, the pine, pinastr, and cedar of Lebanon, I have tried upon such soil as this, even stark sand ; and they prosper very well : they are all of one nature in point of drawing their nourishment, and seem to receive more benefit from the air and dews, than from the earth. There is a good example at the earl of Aylresford's, near Guilford, in Surry, of the fir. And it is not only in such simple sand, but even in the clefts of rocks, or any where that the roots can take the least hold, we find firs, pines, &c. prosper extremely.

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THE ash prospers very well upon this light soil, if it is but deep enough, the roots will make their way downwards, till they meet with nourishment enough. So the French furze grows very well in the same kind of soil; and the black fallow, which is one of the most spongy of the fallow, or willow, thrives very well in this dry soil, for it feeds abundantly upon the air and dews. Thus far for the natural plants that are profitable in sandy or light dry soils. I come in the next place to plants which will agree well with the midling soil, which is heavier than the sand, and lighter than clay, which I call loam or mother-earth. This sort of soil, if it be well stirred, will receive and nourish every sort of plant, without any manure; so that I need not mention any particular plant, every kind of corn or grain does well, and so does every sort of tree or plant whatsoever, as I can find; for it is not too stiff to admit the tenderest roots, nor so light but that it will hold nourishment enough to support any plant. So this soil likewise, is open enough to receive the help of the sun's warmth, and the rich virtue of the air, dews, and rains.

WE come now to speak of those soils which are stiff and heavy, such as clays, chalks, &c. we are to consider those soils to be very rich, if they are well wrought

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and broken, but we are not here to speak of any manures, I have said enough of them in my second chapter of this book, my business now is to remark only what plants will prosper in these stiff soils, as they are simply. These clays are good for several sorts of grasses, but chiefly for producing of ryegrass, also horse-beans, windsor-beans, or such as are commonly called garden-beans, teazles, cole, rape, weld or dyers-weed: and also I have seen woad or wodd, grow very well in clay grounds. The lucern or medick-clovers, likewise grow very well in such stiff soils, if they are not over wet; but indeed I have not seen them do amiss in any soil, but in the stiff soils they last longer good than in the light soils. So will also the St. Foine, grow to be of good value upon these soils; and the mock-saffron, as they term it in Oxfordshire. Also these grounds will do well for flax, if we break them well enough on the surface to receive the seed: this is likewise agreeable to hemp; and for timber, the oak, the chesnut, the walnut, and for other trees the elm, the sycamore, the maple, the horn-beam, the beach, the holly; and if the land is wet or annoyed with water, the arbeal, the alder, the willow, the fallow, the osiers of several kinds, and the reed, which turn to good account, to be planted in large tracts of ground. And
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if the ground is white clay or fat chalk, the box, the yew, or yeugh, and the juniper : witness those parts of Surry, where they grow seemingly wild. And the blue clay, though it will of it self produce no valuable herbs or plants, that I have yet observed, yet will bring willows, oziers, black poplars, and most of the watery trees, if we set them : or if we were to set this clay with pear-trees, they will grow very speedily, and make good wood, even to out-grow any trees that can be planted, if we manage them rightly at the first planting, by setting them on hillocks ; and when they once strike root, the roots will even penetrate the clay. We may graff these stocks with scions of the quickest growers, such as the quiss madam-pear, which is a bold shooter, and may very quickly cut it for the wood sake, without having any regard to the fruit. I mean to plant it coppice-wise, without being at the expence of going to the nurseries for them, but raise stocks from the kernels, and those which do not open to be free shooters, graff them. A bundle of scions may be had from any tree which shoots freely, and then the expence will not be greater than any other way of planting a coppice ; and what matters it if we were to burn this as we do other coppice wood, if it burns well and comes cheap.

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As for its making good fire-wood, I have experienced it to burn fresh from the tree ; or if we let some of them run up for standards, the wood of the pear-tree will come soon to a valuable degree of growth, and be useful to turners, button-makers, and joiners, or frame-makers ; why then may we not reasonably plant this tree as well as another for firing, and other useful wood ; especially since it will triumph where any thing else will but barely grow. Or we may sow our pear-kernels upon the spot, if the seeds have but staple enough to sprout in, which need not be above an inch. But I must desire my reader to remember nothing in this chapter is to have any manure ; though it is a pear-tree I am speaking of, give it no dung, but use it as you would do alder or arbeal, that you would plant with roots : and tho' it is a fruit-tree, never prune, but when you would make a fall. I think if the blue clay simply will do this, it is valuable ground.

BUT there is an other valuable quality, which commonly attends this stubborn clay, though such ground is said to be good for nothing, and is upbraided with being the most barren land ; and that is, we find it generally so disposed or situated that it has water enough about it, so that it may be brought upon it, we may then make good repositories

ries for fish, for we need not fear that such ground will not hold water; and experience declares, that a water upon such a soil is very feeding and nourishing for fish, especially carp, tench, or perch, but the two first especially. But if we would not turn it to this use, I conceive we may easily bank it, or dispose it so as to receive and hold water, either from the land or from the heavens. But before the water is let into it, let it be ploughed, no matter how coarsely: for then the water lying upon it a year or two, will correct the ploughed part, and and dissolve or make mud of it; and by removing the stiff and binding quality, will render that mud when it comes to be exposed again to the air, a fine rich mold. When we can perceive this, we may let off the water, and our soil then will not want any improvement from manures; but be as proper for the support of any herb or under-plant that may be put upon it, as the land which is the most esteemed.

I HAVE already observed in this chapter, that the fir, pine, pinafter, and cedar of Lebanon, will all grow on rocky places, where there is the least surface: we may even sow them in the crannies of rocks, and they will grow there, as we find by many instances in the Northern parts.

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THE most rocky and stony places, where there is the least earth, will produce such things as are fibrous rooted, and do not run deep, but in such grounds is generally something profitable, as minerals, which being opened may turn to good account; gravel, or any quarry of stone will be very advantageous. Thus I have given an account of the several ways of improving barren grounds, from experience and observation: where I have taken from any author, I have done him justice in my acknowledgments, but I am persuaded my reader will find I have had little occasion to fill my book after the common way, with other mens works.

C H A P. XIV.

Of the Improvement of Ground by shifting of Crops.

THIS branch of husbandry is one of the most considerable part of the husbandman or farmer's skill, for by this in a great measure, the expence of dung is saved, and the ground which now lies every year unemployed would bring good crops. The reason which supports this knowledge is, that

that earth alone is capable of receiving and nourishing plants of several distinct kinds; and as the nature of one plant is different from another, so is the nourishment that every one draws from the earth. This is instanced in every field, and in every garden, where we see varieties of plants in multitudes thriving upon the same ground; but in the Middlesex husbandry we may find the vast benefit that arises by such power in the pure earth. The earth or soil in Middlesex is, however, no better than the soil of Hertfordshire and Essex; and yet we find that such of the Middlesex farmers who are men of sense, will raise above twice the profit to themselves out of one hundred, or any quantity of acres, than the farmers do in other counties. In Middlesex we account a farmer is either negligent, or does not understand his business, who lets any of his enclosed ground lie idle; tho' in Essex and Hertfordshire the farmers are so far of a contrary opinion from custom, that they always leave one third of their farming ground at rest every year; and another third part of which they call their *etch*, is what they reckon brings them in little profit, in comparison of their tilled crop, which is troublesome and expensive to them, and makes the other third of their ground; and so they shift grounds every year, as I shall explain

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in the following chapter. I cannot say, however, that this is altogether the tenant's fault; some of the landlords are to blame in imposing this method upon them in their leases, obliging them not to third-crop any ground, but to take the land in turn, as I have said; but it is an old error, and obstinately maintains its ground to the detriment of all concerned in it. I doubt not, however, but when this case is taken into consideration, we shall find the farmers of the best judgment, who live remote from Middlesex, overcome this custom, and take the benefit of all their lands every year.

FOR this end we must observe the difference which there is between one root and another; and we may be sure also, that the offal or stubble of every plant, will turn to good manure, where it rots, and enrich the ground; so that one plant serves to enrich the ground for another, and besides, the often stirring the ground, keeps it fine and mellow.

WHEN the ground is tilled, the first crop is wheat, and when that is off, they plough the same for pease, which they sow about the end of October, and gather green, and send to the markets; so that these crops are off in May or June, or if they let them stand for seed, the seed will be ripe and fit to house or stock by the beginning of July,
and

and then they plough up the ground again, and sow it with turnips, which will be off the ground by January; and after this plough it for kidney-beans, which they sow the beginning of April; and when these are gathered, either green or ripe, which will be about the end of September, they plough again, and about the end of October set beans to stand the winter, which will be off by the beginning of June following: And after this they plant the whole with cabbage plants, which are off by the middle of February; and then sow the ground for summer turnips, which will be off in June, and the ground may then be ploughed for spurry, (but few in England practise this, but it is frequent in Flanders, and it will serve for a good winter fodder;) and the February following sow the ground with onions, which will be off in September, and then the land may be again sown with pease to stand the winter, to come off in June; and the next month July, sow the same with carrots, which will be ready to draw about October, and are called Michaelmas carrots; and after these you may set beans in February for a summer crop, and so on by changing crops: after this manner is the practise among the most expert husbandmen about London on the Middlesex, and the Surry and Kentish side.

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LET us see now in a table the variation of crops, as they may be followed in another manner.

October, 1726. Sow wheat, the wheat will be off August, 1727.

February or March, 1727. Sow barley, which will be off July or August, 1727.

October, 1727. Set beans to be off in June, 1728.

July, 1728. Sow turnips, which will be off in February, 1729.

March, 1729. Sow pease, which will be off in July, 1729.

July, 1729. Sow spurry-seeds for winter fodder, to be off February, 1730.

April, 1730. Sow kidney-beans, to be off in September, 1730.

October, 1730. Sow pease to stand the winter, to be off in June, 1731.

In July, 1731. Sow carrots, to draw in the winter about December and January.

January, 1732. Plant cabbages, to be off in August, 1732.

August, or the beginning of September, 1732. Sow spinage for winter, which will be off the end of February, 1733.

February, 1733. Sow onions, which will be off in September, 1733. or sooner if they are bunched, and sent to market about July.

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October, 1733. Set Spanish beans, to be off in June, 1734.

July, 1734. Sow turnips, to be off in January, 1735.

January, 1736. Set carrots for seed, which will be off in September, 1736.

January, 1737. Set onions for seed, if the ground be enclosed and well sheltered; these will be off in September, 1737.

October, 1737. Sow pease for the winter standing, to be off in June, 1738.

July, 1738. Sow carrots and onions, to draw in winter, to be off in February, 1739.

February, 1739. Plant potatoes, to be off in September or October, 1739.

February, 1740. Set beans for a summer crop, to be off in July, 1740.

July, 1740. Sow spurry, to be off in January, 1741.

February, 1741. Sow woad, or wodd, to stand one year, to be off in November, 1741. But this may stand two years.

February, 1742, or in March. Sow tares, to be off in September, 1742.

September, 1742. Set Spanish beans, to be off June, 1743.

July, 1743. Sow turnips, to be off in January, 1744.

February, 1744. Sow coriander-seed, to be off September, 1744.

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October, 1744. Sow pease to stand the winter, to be off in June, 1745.

July, 1745. Sow carrots, for young carrots in winter, to be off in January, 1746.

February, 1746. Plant madder, if the ground be not too stiff, to stand till the third year, viz. till the year, 1749 'tis a profitable crop.

February, 1749. Sow broad or Wind-for beans for a summer crop, which will be off in July, 1749.

July, 1749. Sow turnips, to be off January, 1750.

February, 1750. Plant licorise, to stand till November, 1753.

February, 1754. Sow pease for a summer crop, to be off in June, 1754.

July, 1754. Plant saffron, to stand till June, 1757.

July, 1757. Sow turnips, to be off January, 1758.

February, 1758. Sow barley and clover, the clover to remain after the barley is off.

AND after this manner we may continue to change our crops upon the same piece of land for fifty years, if we please, or as long again, without injuring the land; but when I lay down these directions it is not to be supposed that all lands at one time are to be cultivated in the same manner, but one par-

cel is to be ordered one way, and another in another manner; and for the practise of the foregoing table, we may turn it topsy turvy if we please, it is not positively to order what crops must follow one another, but to shew what crops may follow one another, that the ground may be kept open, and no time lost.

AND in the disposal of one's ground to keep up a succession of crops as before mentioned, we ought to consider our markets, which sorts will best sell and bring the most profit: however, as I observed before, we must never follow our crops with plants, which are meerly of the same nature. We may take, therefore, any four or five years crop out of this table, and when we have gone through them, we may begin again, unless the first and last crops should happen to be the same, and then we may find variety enough in the table to make a proper alteration.

IN Middlesex and other places where this method is practised, the farmers are half gardeners, the fields are like gardens, and the return is very considerable; but this general improvement in the fields has not been of very long standing, it is hardly nine years since onions were made part of the field crop; and about a dozen years, as I am told, since kidney-beans have been raised
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in the fields about Battersea and Wandfor in Surry ; cabbages likewise are lately made field crops ; and many other such like plants which were thought only capable of being nursed or brought to perfection in a garden, are now found to prosper as well in the fields. Mr. Hartlib tells us, that when gardening was first set on foot in England, that the gardeners from abroad had much ado to procure a plot of ground for to begin a garden in, and that tho' they gave eight pounds per acre per annum, yet the gentleman they hired it from was discontented, fearing least they should spoil his ground by digging it ; so ignorant were we of gardening, and the improvement of land in those days : and it is in my opinion still more surprising to find, that notwithstanding the use of the plants and herbs I have mentioned in the former table, is so generally known, yet the Middlesex husbandry is not come into practise in the remote parts from London, nay not even into the adjacent counties, but I suppose it is owing to the want of instruction ; for every plant that will grow in a garden, will as certainly grow in a field, and one sort may be raised with as little trouble as another. But I come now to speak of improvement by enclosures.

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C H A P. XV.

Of the improvement of Land by Inclosure, the repairing of Highways, and preservation of Game.

I HAVE endeavoured in this work to shew the several kinds of improvement that may be made upon those lands which are esteemed barren, or have not yet been reckoned among the profitable grounds; but the most considerable improvement that I can recommend to the publick is the inclosure of land; for without good enclosures the farmer has little courage to undertake any thing, for ground which lies open on all sides is subject to many hazards; it is partly for this reason that we find the common fields and the champain country is so far neglected, that the farmers of such grounds do not crop them above once in three years about the North of Essex, and many other places in England, tho' the lands are very capable of bringing good crops from year to year, if the crops were judiciously shifted so as to follow one another gradually, as I have intimated in the foregoing chapter. But there are two reasons why I suppose the inclosing of grounds is neglected, the one is, that in such lands as are called commons, there are the

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the rights of so many people concerned, that it is hard to bring them to agree about the division; some of these are upon such a foundation, that every tenant according to the proportion of land he holds, has a right to turn in a certain number of horses, cows, or sheep for summer-feed, only if it be in grass, or if the commons are arable land, then a certain number only of sheep in the winter; and some commons are so appointed, that none but the poor of the parish have lawfully any right to them. In the first, which is grass land, I observe that the rule is not observed so strictly, but that more cattle are turned in by the toppers of the place, through a little friendship with the steward, than the grass will bear; by which means those poor people who have a bare right to feed a cow apiece, have their cattle half starved. Therefore it would be much better for the poorer sort, to have their pasture set out to them, or the common inclosed in such parcels, as every one might enjoy a proportion according to his right; nor would this be the worse for the lord of the manor, for when every one had a kind of possession of his right, it would be an encouragement for them to improve upon it, either by planting or manuring, which in the end would redound to the landlord's profit, and be advantageous to them while they

they held it; or if it happens to be arable common, or common field, as it is called, where certain tenements have sheep walks for appointed numbers in the winter, or to go upon fallows: this is a discouragement for any particular tenant to undertake any thing for the improvement of such land; for was one to cultivate the least part of such land, while the others turned their sheep upon it, the sheep would know no bounds, but feed upon this particular piece, as well as what they could find elsewhere; but if such lands were parcelled out and inclosed, would they not produce profitable crops in as good succession as the lands in Middlesex, and those parts of Surry and Kent near London which are like them in virtue, and are never idle? I see no reason to the contrary, for the same men are as strong, and can bear the same burden in one country as in another. I remember once there was an attempt of bringing such a common field as I now speak of into good order, so that it might produce something every year; and all the farmers of good sense had agreed, but one or two who were ignorant enough to know nothing, but what their forefathers had taught them, and had a great share of laziness withal, would not come into the agreement, but they were used to feed sheep there, and would feed sheep there, because

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they would, and so the design proved abortive. In such a case the ignorance of one or two, prevented the good designs of twenty; for there was no fence between the good designs of the one, and the rudeness of the other. Why then cannot such fields be parcelled out, and every particular right made several with a good fence? But then the query is who should do this, the landlord, or the tenant? the tenant will tell you he has the ground only for a term of years, and it is not worth his while to lay out more money than is necessary for the production of his crops; and the landlord, he has already let a lease at so much rent, and he is now at a certainty without being obliged to any expence, and he knows what he has now coming in, and for him to advance money for improvement, when he has already given a lease, is throwing away so much money, &c. and so nothing's done: It would, however, surely be beneficial to the landlord, as well as to the tenant; for the landlord would reap the benefit of the plantation about such enclosures, especially if timber or other profitable trees were planted in the fences, and the ground would be entirely at the discretion of the tenant to make the best of it; besides the benefit he would have by the enclosure, to shelter his crops from high winds, storms and blasts, which

which oftentimes, when there is the fairest opportunity of good crops, come on a sudden in open places and destroy them. The foregoing chapter will shew us, that if a tenant does not follow the ground continually with the same crop, he cannot spoil the ground, so that the landlord need not be under any apprehensions about that; tho' I believe it was formerly a common practise to sow the same crop successively for many years upon land, because I find that in many leases now standing, it is provided, that the tenant shall not third crop his land under a penalty; but these leases, I suppose, were only taken from the old ones, without consideration. I am well perswaded from experience that such a clause in a lease is disadvantageous, as well to the landlord as to the tenant; for the more a tenant can make of land, the more valuable will that land prove to the lord. I do not here mean the continuing of one kind of crop, from year to year upon land, but the shifting of crops. The third sort of common that I mentioned, was that which by some charitable gift was appointed for the poor only; these I generally observe are crouded with cattle, and the poor, for the most part, come off with the least share of the profit. The great ones, in many parishes that I know, where there are such commons, are not a-

shamed to partake of the poors rights, but even take more than their share would come to, if they were really poor, and in the mean while the common poor have not feed for their cattle. In this case surely it would be much more for the poor's interest to have their common divided, and set at a certain rent, by which means every one would have his right paid him in money, or else take his parcel of land to himself, and employ it to the best advantage.

BUT there is another strong reason which prevents inclosures, and that is on the gentlemens side ; it is much better hunting and sporting in an open country, than among inclosures. This I have had objected by some great sportsmen, who rather chuse their sport than the improvement of their estates : but however hunting is a noble exercise, yet let inclosures begin never so soon, there will be enough land left open in every part of England for such diversion, tho' I find in the enclosed parts the keen sportsmen do not baulk their sport for a leap or two; for in such countries they use the proverb, The more danger, the more honour, and it is evident, that in all enclosed countries, there is the greatest plenty of game of all sorts; the good riding in the champain country, however, is a great temptation, especially to the fox-hunters, who

who of all others are the most eager sportsmen, and are even so enchanted with that exercise, as to encourage the breeding of foxes, as I know some gentlemen now do with abundance of expence and care, tho' to the loss of their own, as well as their neighbours poultry. While I am speaking of this, I cannot help taking notice to those gentlemen who are lovers of game, and would encourage the profitable kinds of it, as hares, pheasants, partridges, and such like, that the best method that can be taken to prevent their destruction by poachers, is to get a law made that every poulterer, or such person whose trade tends to sell any of these game, should be obliged to take a shilling for a hare, and no more; as much for a pheasant, and no more than sixpence for a partridge; it would not then be worth the poacher's while to go about such work, his profit would not countervail his trouble, nor would he run that hazard; for if the poulterer can have but a shilling for a hare, the higler that brings it to him cannot expect above eight pence, and he that catches it will hardly get a groat for it. But the high prizes such things bear at present, make idle persons venture all hazards for them, and destroy perhaps two thirds of the game that is killed every year; it is much the same case as the running of goods,

we find that those foreign goods which have high duties upon them, are the only things which the smugglers take in hand; for such others as have small duties upon them will not answer their trouble and hazard. But I return now to the business of inclosing, and to speak more largely of its benefits.

MR. FITZ-HERBARDE, whom I have had occasion to mention on many good accounts in this work, gives us something on this subject worthy observation, in a chapter wherein he proposes to make a township that is worth twenty marks * a year, worth twenty pounds a year. His words are,

It is undoubtedly, that to every townshipp that standeth in tyllage in the playne (plane) country, there be arable lands to plow and sow, and common pasture to keep and pasture their cattle, beasts and sheep upon: and seyle (or ley ground, which is grass that has been laid down) and also they have medow ground to get their hay upon. Then to let it be known how many acres of arable land every man hath in tyllage, and if they lie not together, let him change with his neighbours till he can have them all together, and make him one ferial close (field

* A mark is thirteen shillings and four pence.

or inclosure) for his arrable land; and so for the leyse (ley ground) to lay them together in one field, and also an other several close for his portion of his common pasture, and also his portion of his meadow in a several close by it self, and all these fenced and kept in several, both in winter and summer: and so every cotage shall have his portion assigned him according to his rent, and then shall not the rich man oppress the poor man with his cattel, and every man may eate (feed with cattle) his own close at his pleasure; and undoubtedly, that hay and straw that will find (feed or serve) one beast in the house, will find (serve) two beasts in the field, and better they shall like. For these beasts in the house, (that are kept in the house) have short heir and thinn, and towards Marche they will pyle (shed their heir) and be bare, and therefore they may not abide in the field before the herdsman in winter tyme for cold; and those that lie in a close, under a hedge, have long hair and thicke (thick) and they will never pyle, nor be bare; and by this reason the husband (farmer) may keep twyle (twice) so many cattel as he dyd (did) before.

This is the cause (advantage) of this ap-
provement (this improvement) every hus-
bande hath six several closes, whereof three

be for corn † the fourth for his leyse (ley ground) the fifth for his common pasture, and the sixt for his hay; and in winter tyme there is but one occupied with corne, and then hath the husbände other five to occupp till lent come, and then he hath his salowe field, his ley field, and his pasture field all somer; and when he hath mowen his medow, then he hath his medow ground also; so that if he have any wayke (weak) cattel, he may put them in any close he will, the which is a great advantage; but yf (if) all shoold be common, then would the edyshe of the corne fieldes (fields) and the after-moth of all the medows be eaten in ten or twelve days: the ryche (rich) man then that hath moche catell would have the advantage, and the pooz man can have no helpe nor releffe in wynter when he hath most need: so if an acre of land be worth six-pence, when it is not enclosed, it will be worth eight pence when it is enclosed, by reason of the composting and donging of the catel, that shall go and lie upon it both day and night.

† Here the old custum appears of granting leases on condition, that but one crop of corn shall be raised in three years upon the same piece of ground: and it is now continued as a practise in some parts of Essex to divide their arable lands in these parts, and take their round in sowing of corn, one in 1726, and another 1727, and the other in 1728, and then begin again.

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And if any of his three closes that he hath for his corn, be worn or war (grow) bare, then he may break and plow up his close that he had for his leyse (ley) or the close that he had for his common pasture, or both, and sow them with corn, and let the other lie for a time, and so shall he always have rest ground, the which (when it comes to be renewed) will bear moche corn, with litell donge; and also he shall have great profit of the wood in the hedges when it is grown; and not only these profytes and advantages before said, but he shall save much more than all those: for by reason of these closes, he shall save meat, drink and wages of a shepherd, the wages of the herdman, and the wages of the swine-herd, the which may fortune to be as chargeable as all his whole rent; and also his corn shall be better saved from eating or destroying by catel. For doubt ye not but herdmen with their catell, shepherds with their sheep, destroyeth moche corn, the which the hedges would save. Paraventure some men would say, that this would be against the commonweale, because the shepherds, herdmen, and swine-herdes should then be put out of wages. To that it may be answered, though these occupations be not used, there be as many new occupations that were not used before, as getting of quicksets, ditching, hedging and pletch-

pleshing, the which the same men may use and occuppe; also it may fortune, men will say, that if all should be enclosed, that there wold be many foule lanes as there be in Essex, but for that there may be a provision, and that is thus. Where the king's highway is, if it be dry grounde, stoney grounde, or sandy grounde, in all such places may be lanes made of a convenient breade (breadth) for the king's people to passe through with all manner of carriage: and where it is soft ground lying level, that waters will not pass (run off) by the dytches, then at every hedge that goeth overthwart (across) the hwyway (highway) there to make a gate, and stone it or gravel it in that place, and then hath every man the whole close, to ride, carry, or go in as they had before; likewise as they do at the Wyndgates going to Chorley in Lancashire, and likewise from town to town; and as for their own drift lanes in their closes, let them make them for their own ease, as they will have them.

The moost indifferentest mean to make these approwments, as me seemeth, is this. All the lords (landlords) of one town, be there never so many, should be all of one assent; that their tenants should exchange their lands one with another, and the said exchange to stand and endure for ever; for
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doubt them not, but they know it best, and every tenant for his own advantage will do it indifferently, and the curate of the same parishes for his part; and every lord's bayle to be indifferent to see these closes lotted and assigned to every man's ease, so that every man may have a croft or close next to his house, if it may be.

This done, let every lord (landlord) by his copy of court-rolle, or by indenture, make a sufficient lease to every of their tenants, to have to him, to his wife, and to his children, so that it pass not three lynes (lives) the persons then being alive and named, yielding and paying to their lords, and to their heirs, the old rents and services before due and accustomed, during those three lynes, upon this condition; that they shall do or cause to be done, during their lives, sufficiently to quickset, diche, hedge and plash, when need is, all the said closes, and so keep them during their lives, the which will be a charge to the tenants; but yet we seemeth they may well do it, if they intend to thrive, and specially if they do regard the profits that may come to them afterwards; for levis est labor, cum lucro, i. e. it is never laborious to gather riches.

Thus far Mr. Fitz-Herbarde has given his sentiments concerning inclosing of lands, in such intelligible terms, that they have
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no need of explanation; but one may observe that there is a vast difference between the value of land or money in his time, and the days we live in; his enclosed land was valued at eight pence an acre, and we have enclosures in our days worth thirty and forty shillings an acre, or three or four pounds; but when he lived, a good sheep was worth about six pence or eight pence, and a fat bullock worth about three or four shillings at the most; and now a good sheep sells for eighteen, twenty, or five and twenty shillings; and a fat bullock for ten or twelve pounds. But the letting of estates or lands for lives, is the same as at this day is practised in Devonshire, and other western counties, and is both profitable to the tenant and the landlord. If our commons or waste lands should happen to be enclosed, or any of them, it would be necessary on every occasion to make a survey of the lands, and their division, and to have three or four surveys made of every enclosed common, one to be deposited in the hands of him who is keeper of the roles of the county, one in the hands of the parson of the parish, one in the church, to satisfy the enquiry of every parishoner, and one to be delivered to the lord of the manour. This I think more especially should be done in this manner to prevent disputes that may happen here-

hereafter about the parcelling of the ground, and is the surest way of securing the right to every particular person concerned in the division; and I am persuaded, that if every parish now in England was to have the contents of their lands surveyed, and the charts or maps disposed in the manner I propose, it would prevent many tedious disputes; as I know there are some now depending to the disadvantage of both the contending parties. I insist upon making maps or charts in an extraordinary manner on this occasion, because for the want of these, it is not only the different parishes going to law with one another, which is the grievance, but it occasions quarrels and disputes between the most intimate friends. To prevent these inconveniencies for the future, it is that I recommend these maps, which may be made in the best manner by the surveyor, which is employed by Mr. Fowler, mathematical instrument-maker in Swithin's-Alley, near the Royal-Exchange, London; who is not only very accurate, but very neat in his drawings.

As for the roads, which are necessary to be appointed in laying out such commons, we must allow they will take up some room; but if we consider that every common must necessarily have a road over it, we may be pretty sure, the roads which are
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fenced in, will not take up so much room as the roads which lie a-cross an open common, which sometimes are half a mile wide, as one may see in some of the forests on Salisbury-plain, Bagshot-heath, and many others; the turnpikes, indeed, have mended some, but have spoiled others through mismanagement. The road by Stump-cross near Cambridge, which was about twelve months ago made a turnpike-road, is now worse than it was before; for the ground of it self is bad, and being confined within certain bounds, the carriages that pass that way, have not now the liberty they had before of shifting their tracks; and unless the season is very dry, a loaded waggon cannot make its way. This road, however, might be mended, for there are good materials at hand, or chalk and gravel; and there are many other turnpike roads in as bad condition, which I imagine proceeds from the letting them to farm, before they are well mended and put in order; or else that the undertakers do not understand their business. The farmers of such roads we suppose will make the best advantage they can of their farm, and regard their own profit before the mending the roads; but if they remain bad through the want of understanding in the workmen, who are employed about them, it is more excusable.

I shall

I shall therefore give my reader some particular remarks I have made relating to the mending of roads before I conclude this chapter, but first shall offer a word or two concerning the disposing of roads to the best advantage, and greatest ease of the farmer, when it shall happen that any large tract of ground may be enclosed. It is very sure that some estates were at first so judiciously laid out, and the drift ways from field to field so well contrived, that there is not half the trouble and charge in passing and repassing with carriages, that there is in other estates of the same compass that were enclosed without skill or consideration: and also we find twice as much ground taken up in drift-ways, or roads, as need to be in many places; these two cases equally carry damage to the landlord and the tenant; the more ground is expended or wasted in roads, the greater loss to the landlord; and the more roads the tenant has to pass with his carriages, the more expence he will have in men and cattle's labour. These ways are generally in bad condition towards winter, if the ground is good for corn, for that is pinguid or fat soil; and one may set it down as a rule, that a good corn country is always a dirty country, even so bad sometimes for carriage in some places, that a farmer's greatest difficulty is to get his corn to the market. The lanes or drift ways about

such farms are generally bad, for two reasons ; the first is, because the farmer has not leisure or a will to mend them in the summer time, and chiefly because they have trees growing on their sides or verges, which by continual dripping in wet weather, and dropping their leaves in autumn, and above all, shadowing them from the sun, they lie in a continued poach and mire. This we prove by many instances, in every farm we have an example of it. I suppose Mr. Laurence had not been very conversant with the farmers, when he advised us in his volume of husbandry to have trees planted on the sides of great roads for timber, or else, perhaps, he has only travelled in the heat of summer when the roads are good : there is no way so rational and so easy, in my opinion, for mending these lanes or drift-ways among farms, as to cut down the trees on each side to lay them open to the sun, that they may be rid of these inconveniencies, and then there may be a possibility of mending them when they are dry, by filling up the holes with brushes of wood, laid cross the roughts or rutts, but chiefly with faggots of broom, which will last a long time. I have even seen faggots, or trusses of bean-stalks laid cross hollow and deep roughts, and covered with gravel or stones, and have held good a year in a way much frequented, but do what you will towards mending these ways,

ways, unless they lie open to the sun, you will never bring them into tolerable order. It must be noted however, that before we lay these faggots or bavons, or kids of broom, or any other thing crosse the roughs, we must break them down, and level them with mattocks or pick-axes, when they are dry. And if gravel or stones are to be had near at hand, lay a coat or covering of it upon the wood ; but if the wood or fagots are laid length ways in the roughs, they are of no effect. Every carriage that passes over them will sink them deeper and deeper, till they are lost, because they cannot then give a due resistance against the wheels and carriages, and all care should especially be taken to carry off the water, by filling up the holes and giving the road a current if possible. Mr. Fitz-Herbarde, gives us the following account of mending roads in his time. i. e. About two hundred years ago. *He seemeth* (says he) *it is necessary to shew my opinion how a hye-way may be mended. And first and principally, see that there be no water standyng in the hye-waye, but if that it be always current and runnyng, not abiding more in one place than in another. And in the somer, when the water is dried up, then go get gravel, and fill up every low place, and make them even somewhat descending, or current one way or other ; and if there be no gravell or stones to get, yet fill it up with*

T

earth

earth in the beginning of somer, that it may be well hardned with carriage and treading upon, and it will be well mended, if the water may pass away from it, which shold be considered, and especially about London, whereas they make moche more cosse than nedeth; for there they dicke their hye-ways on both sides, and fill up the hollow and low places with earth; and then they cast and lay gravell aloft upon it: and when the great raines or water cometh and sinketh thorow the gravell, and cometh to the earth, then the earth swelleth and bolneth, and wareth soft, and with treading, and especially with carriage, the gravel sinketh and goeth downwards; and then it is in a manner as a quicksandel (quick-sand) that hard it is for any thing to go over it. But and they would make dyches in somer time, when the water is dreyed up, that a man may see all the hollow and low places, and then carry gravell and fyll (fill) it up as high as the knoles (higher parts) be, then will it not bolne or swell, nor be like quykke (quick-sand) and every man may go along the hye-way with his caryage at their pleasure: and this me seeweth wyl be lesse cost, and lenger (longer) will it last by being mended in right time; for so have I seen done in many places, where I have been. Thus far my author of the manner of repairing of roads in his time. And his observations are so just, that

that the most judicious hold the same rule to this day, with some little improvement, as the making drains sometimes under ground and sometimes carrying off the water in open ditches, and sometimes filling up of hollows, or little vallies, as one may call them, with stone, rubbish, and gravel, that are ten foot deep or more, at the expence of several hundred loads. The season which he recommends, which is the driest time of the year, is found to be the best ; and the laying of the roads rounding to shoot off the water, is also practised. But what our author observes concerning the laying of loose earth under gravel, that it proves disadvantageous, one may observe every year in some of the roads about London, where it is practised, and produces such a mud as he speaks of. But tho' the common practise of repairing of roads is to lay them round in a convex manner to shoot off the water ; in flat countries there is another way of mending the bad roads in such places as have any descent or decline a little, which is by laying them hollow or concave, instead of laying them high and round ; and about the higher parts to dig ponds, or receivers for water, to be supplied with springs, if you have them, or to receive land shoots or rain water, which ponds will surely hold water without using any art, because the very bad roads we speak of, are always in clay countries. The roads being laid hollow, and the

T 2

ponds

ponds prepared and filled with water ; as soon as we find them begin to be muddy and deep, turn the water from these ponds upon them in flashes, and they will presently be washed very clean, and so remain till bad weather comes again, and then the ponds will be renewed, and be ready to do the same service. There are several good instances of this kind now in practice, one particularly in the road from London to Oxford, which I think was the first publick experiment that was made of it ; and was the contrivance, as I am told, of Mr. Tillingham Bobart, brother to the late Mr. Bobart, of Oxford. This method has been so much approved, that I am perswaded there can be no better way of mending such roads or lanes, as are hollow and dirty ; for it surely carries away all the mud, and leaves only the firm bottom, which upon every opportunity of a little fair weather, will dry and harden, if the side of the road is open, and free from the shadow and drip of trees. In some places we find also that chalk is of very good use in the mending of roads, but especially if it can have a covering of gravel : however, the chalked roads are not to be complained of, except that in wet weather they are slippery, but they are hard and firm, and very durable with little repairing. Such roads as these
however,

however, should be laid high, and a little rounding, and always be made in a dry season, as soon as the weather is settled, that they may have time to fix and bind before the rains fall ; for else they will poach, and be muddy all the winter. Where we have culture ground, there can be no want of stone ; and in such countries, they may easily be had for repairing the roads. But these rough stones are a little inconvenient at first, unless we can find some binding soil to mix with them. But as I observed before, these roads must be made or mended early in summer, that they may have time to settle before the rains fall. When we find boggy places, which are deep and springy, and cannot find any way to drain off the water, the best way is to sink bavons of wood with large stones, one cross the other, and cover the whole with stones, but no gravel : these bavons should be at least seven foot long. I have seen some of this work, which has taken eight or nine layers of faggots, one over the other, before they have been brought to good ; and upon them a covering of large stones, about two foot thick. This has lasted three years, and the passage is still very firm and secure. But I should remark, that the bavons which were laid in this place, were all of elm. From these directions, I doubt not, but any

one may put their drift ways or lanes, into good order : for tho' in some cafes, water is a difadvantage to fuch places ; yet in others it is of good ufe and fervice. I believe every farmer, as well as every country gentleman, loves the pleafure of good roads ; and efpecially when they confider that they fave horfe flefh and their fervants time and labour, in bringing in and carrying out their crops, which is no inconfiderable article. This is the good of turn-pike roads, where they are well managed, and well kept, a team of horfes may draw a greater load, and a farmer be fure of his time in going and coming, without the danger of overthrowing, or fetting, or of fpoiling his cattle, or of breaking his gears ; and therefore the expence of turn-pikes, may well be paid without grudging, feeing the pleafure and profit which arife by them in faving of time and labour, and the faving both the wear of his cattle and carriages. And the lanes and drift ways about a farm, if they are repaired and mended in a feafonable time, will prove no lefs advantageous to the farmer, in fuffering cattle and men likewise, to make three turns for two ; and fometimes in helping the difpatch of bufinefs, in above half the time that it ufed to take up. There are fome farms where the drift ways are fo bad in the winter feafon, that the farmers can-

not carry their corn to market at the seasons when it is the most wanted ; and thereby loose sometimes the opportunity of a good sale, besides the hazarding a man's life sometimes. But I judge that I have said enough of this, and shall now give my reader a word or two concerning land shoots, or shoots of water, which happen in hilly countries upon every dash of rain, and in time wear deep holes in the roads where these streams pass through, and make them very dangerous for those who have occasion to travel by night ; for commonly every fall of rain, or melting of snow, makes some alteration in them, by the violence of the currents, which on these occasions flow in torrents from the hills adjacent. We may however, observe where these fluxes of waters meet the greatest opposition, there they act with the greatest fury, and wash with such violence, that they often carry away or wear away the banks, or else turn in whirl-holes. It is adviseable in the first place, where they drive away the banks, to secure them well with willow-stakes, planted deep in the ground, and well watled, which will save the banks as experience shews us ; and to prevent their spoiling the road by making of whirl or gully-holes, I have learned from Colonel Bradbury, whom I have already mentioned, for several curi-

ous and useful things, that to cut up tufts of rushes of a large size, and of such a depth, as the fibres of the roots may come up with them, and fill the holes with these close as they can stand together, they will resist the flood and divert its strength ; and by their growth and encrease, will keep that place firm ever after. Thus I shall conclude my observations concerning enclosing of land, and mending of roads ; but as I have already given my reader some hints in this chapter, relating to the preservation of game, I shall beg his patience while I add a word or two more about it.

For the preservation of hares especially, there should be a law, That a hare should not be killed after the first of February ; for every doe-hare that is then killed, will certainly be knit with young, and instead of destroying a single hare, we destroy a leash, or two brace, nay, sometimes two brace and half ; for I have my self killed a doe-hare with two brace of young ones in her belly at this time of year ; and she was so near kindling, that I took them out and kept them alive a considerable time : and when ever I have fortun'd to kill a doe-hare so late in the season, I have found her knit, and forward with young. And besides the jack-hares are then weak, and cannot run as they

they should do; so that hunting or coursing so late in the season, gives but little sport if it be a jack-hare, and is downright poaching and murder, if it is a doe-hare. But moreover, was this rule kept as it should be, that no one should kill a hare after January was past, the farmer would be the better for it; for in January he makes up his fences, and in February begins to put his crops into the ground, and then should not have his grounds broken into or disturbed. This would be the way to have plenty of hares, and for the farmers to have their ground in such order, that their crops might be in good condition, which gives the landlord the surest hopes of his rent.

NOR will this be less useful on account of the preservation of pheasants and partridges, for they no more than the hares, should be disturbed at pairing time, for they then begin to chuse their harbour for breeding; and if they are then much disturbed, they seek other cover or shelter. I know it is the custom to set and draw for partridge at pairing time, and to kill the cocks, believing that the hen will find a cock elsewhere. But the sending away the hen, is not the way to expect a covey in those grounds where we found her; and when the setting season comes in, we shall want sport. Again, there is another thing which I am apt to believe

lieve is destructive to the breeding or increasing of partridges and pheasants, and that is the penalty upon those who kill them under a certain qualification or estate; but the law I before proposed, of making them cheap, may very likely prevent it from the poachers hands: and a little liberty from the landlord to the tenant, or some encouragement to the tenant to preserve them, might prevent a practice which I fear is too common, of breaking the eggs in the nest; for say some people, why should I suffer these fowls to breed here, I cannot be the better for them, and they will only be a means of inviting the sports-men to break my hedges, and disturb my enclosures? This I fear is often practised, and nothing can be a greater destruction than this. If it is a farmer that does this, he may perhaps add, that it is him that maintains all the game upon his farm, and if he pleases, will not suffer his landlord to come upon his grounds to seek after them: and he goes on, that the land is his own as long as he pays rent for it, and then his landlord or a stranger is all one to him. But these things, I suppose, happen seldom, unless the landlords and the tenants are at variance, or some men who have more money than good sense, affront the farmers of their neighbourhood; and then I suppose the affront is resented
this

this way, so that it is of use to have good sense enough to be courteous, and of an obliging temper : for if this be the way of revenge, there is no man can tell who does it, and if it was known, there could be no remedy ; but as long as it lies in the breast of the landlord and the tenant, to oblige one another, it is the interest of both to agree. In short if the method I have recommended be followed, we may be sure that all sorts of game will be plentiful in every part of the kingdom, and it may be a means of keeping up a harmony among the people.

C H A P. XVI.

*The method of Stocking a farm of
three hundred acres of Arable
Land.*

ALTHOUGH I have given my reader in the former chapters such directions as are necessary to instruct him how to improve every sort of soil, it is yet necessary to acquaint him how a farm should be stocked. And for that purpose we must first consider that there are three sorts of farms ; viz. one consisting altogether of arable land ;
another

another consisting of grazing ground, and a third of meadow : to every one of which it will be necessary to speak particularly, that each business may be understood by it self. It is indeed, common enough to meet with farms that have in each of them all the three varieties of arable, pasture, and meadow ; but the methods of stocking them is so very different, that was I not to handle them singly, a beginner in farming would be little the better for my instructions. I shall begin then with the arable farm, which I shall set at three hundred acres, each acre lett at ten shillings per ann. which comes to one hundred and fifty pounds a year. In Essex and Hertfordshire, most of the farmers, as well those who are landlords, as tenants, are wedded to an old custom of dividing their land into three parts, when they enter upon a farm of arable : one part they till for corn the first year ; which crop is called the tilt or tilled crop. After this they plough the stubble of this in the spring, and sow summer corn, which is called the etch : but this is hardly looked upon, to be worthy the name of a crop, it is the wheat they regard.

THE second year, they take another division for tillage, and follow it with an etch crop, as before ; and the third year they take in hand the third parcel, and use it as they

they did the others. And when this is done, they begin again. This is the custom; and I find but few on that side the country, that have spirit enough to break through it, though we find that by this practice, a farmer of three hundred acres, has but one hundred acres employed at one season. But the occasion of this, I think, I have accounted for in my preceding chapter. But as to the stocking of a farm, I shall now proceed and shew not only the particulars which are required, but also the expence of them to be bought in new.

It is a common way of computing, that three years rent is required to be laid out for stocking of a farm, and that a farmer ought to make three rents every year of his farm, to live. These I shall examin in their order.

l. s. d.

The first charge is for horses, which for this use, may be bought in at six or eight pound per horse; and a farm of three hundred acres of this kind, will require two teams of five horses, in each team; so that the amount for horses at the first setting out will be

80 0 0

Three

286 A COMPLETE BODY

Three dray-ploughs, the timber work only may be reckoned at eight shillings per plough, come to

l. s. d.

1 4 0

Collars and hempen-traces, or plough harness, we must set at twenty shillings per horse, which comes to

10 0 0

Iron work to each plough; viz. fillery-hook, plough-share and coulter, after the rate of four pence per pound, will be about eight shillings to each plough, i. e.

1 4 0

Chains and whiple-trees, otherwise called sling-trees to each plough, about ten shillings apiece is

1 10 0

Four pair of broad harrows, of five beams each harrow: the timber alone in each pair, worth six shillings, come to

1 4 0

In every beam of these harrows, must be six teeth or tynes, of a pound each; so that there must be thirty teeth in each harrow, which at four-pence each tooth, amounts to

4 0 0

Two long wooden roles, worth twelve shillings each role, is

1 4 0

Two wheat roles, or bellied roles, about ten shillings per role

1 0 0

Three

Three dung carts with wheels
shod with iron, at nine pounds
per cart; but if the wheels are
flug-wheels, or not shod with i-
ron, then the carts will be only
worth about four pounds apiece.

1. s. d.
27 0 0

Two waggons about seven-
teen pounds each.

34 0 0

Four pair of shut harrows, for
small ridges of pease and oats, of
what is called bullimond; the
timber work only worth four shil-
lings per pair

0 16 0

For nineteen teeth in each har-
row, or thirty eight in a pair, at
four-pence per tooth, comes to

2 10 8

Two pair of barley land-shutt
harrows; the timber and work,
about three shillings per pair

0 6 0

Teeth for the two pair of har-
rows, seventy six in number, at
half a pound each, after the rate
of four-pence per pound, comes to

0 12 8

Chains and coupling-links to
each pair of harrows, after the
rate of two shillings each pair,
will for ten pair of harrows, come
to

1 0 0

Six drag rakes or dew rakes, to
draw together the scattered corn.
The wooden work about half-a-
crown for each rake, comes to

0 15 0

N. B.

288 A COMPLETE BODY

N. B. The heads of these are about eight foot long ; and the teeth must stand about four inches asunder.

l. s. d.

Iron teeth for the above rakes,
about half a pound each tooth,
after the rate of four-pence per
pound, come to

1 4 0

Six pair of harvest ropes, or
ropes for binding, at seven shil-
lings per pair, after the rate of
three-pence half-penny, or four-
pence per pound, comes to

2 2 0

Chain harness for cart and wag-
gon, cart-saddles and collars for
ten horses, at one pound five shil-
lings per horse.

12 10 0

Six pair of iron winch-pins,
with their chains for the carts and
waggons, to be used in harvest,
at five shillings per pair.

1 10 0

Three casting-shovels for corn,
at half-a-crown each.

0 7 6

Three large iron tip shovels,
or plated shovels, about two shil-
lings and four-pence each.

0 7 0

Three shovels for water thor-
rows, one to each plough, at eigh-
teen-pence each shovel.

0 4 6

Three spades, at four-shillings
each

0 12 0

Four wicker fanns, to winnow
corn with, about four shilling each

0 16 0

Two

l. s. d

Two bushel meaſures, and their
irons, about ſeven-ſhillings a
piece. } 0 14 0

Forty ſacks to hold fix buſhels
a piece, at three ſhillings and
eight pence each ſack. } 7 6 8

Rakes, forks, and prongs, about } 2 0 0

Scales and weights for the
corn, &c. } 3 0 0

Wyer-ſcreen, and wyer-five,
to clear the corn from feeds when
it is dreſt, about } 1 10 0

Befides theſe foregoing utenſils and im-
plements of huſbandry, there are many
other neceſſary things which ſhould not be
wanting, as barrows, mallets, bettles, wedg-
es, mole-traps, ladders, brooms, pails, cur-
ry-combs, mane-combs, whips, feed-lip,
feed-peck or cob-peck, pincers, ſciſſors, nail-
percors, gimlets, hedging-hook or hedging-
bill, mattock, pickax, hatchet, ax, ſaw, leaver,
iron-crow, ſheep-ſhears, hog-yokes and hog-
rings, marks for ſheep, coops for poultry,
an awl, and other neceſſaries for mending
the geer, upon any ſuddain occaſion; a
hammer, ſtaples, nails, fledges, the belly-
rope, or wanties for horſes; market-pannels,
chaff-fives, caving-fives, wheat-quafh-fives,
for riping or dreſſing wheat; a timber-jack,
cable chains, a greaſing-trice, uſed to bear
up the waggon, when the wheels are tak-

U

en

en off. These we may reckon worth about twelve pounds.

1. s. d.

Four dozen of oaken hurdles, }
for folding the sheep. These }
hurdles if they are made of saw'n } 9 12 0
stuff, will be worth about four }
shillings apiece.

But if they are made of rent stuff, or split, are worth about three shillings each hurdle. Some are made of good poles, and sold about one shilling per hurdle: or if they are hazle wove hurdles, about nine-pence per hurdle. These last being wove close tother, are much warmer for folding sheep in winter; but are thought to be heavier than the others.

We are next to provide a stock }
of sheep to feed one hundred acres }
in summer, allowing two sheep } 80 0 0
to each acre: these at eight pound }
per score, come to

If these be ewes, then their stock of lambs will be sufficient for to feed your winter store; otherwise if you stock at first with wethers, you must buy in, for wintering, as many as your ewes would bring you lambs, so we shall then have four hundred sheep; but ewes are the most profitable.

We

l. s. d.

We must also buy in twenty
 swine, which may cost (of the
 size which will be the best for
 this purpose) about six shil-
 lings per pig, and may be kept
 about a year, and they will be fit
 to fat for bacon : but they should
 be killed sooner for pork.

6 0 0

Poultry of all sorts, for stock-
 ing such a farm, should be about
 one hundred in number. These
 one sort with the other, may be
 bought in for about one shilling
 each. These come to

5 0 0

This is the first charge of stocking a farm
 of three hundred acres of arable land, in
 Essex and Hartfordshire, according to the
 best accounts I can get, and the strictest ob-
 servations I can make : but these are all at
 the first prices. If a farmer therefore buys
 a stock of a farm at second-hand, he will
 come off much cheaper in the sum he lays
 down : but he must expect the more to be
 laid out in repairs. However, let us sup-
 pose that we buy every thing of the imple-
 ments new, as in the former account ; and
 make a recapitulation of the expence, that
 we may have the whole charge at one
 view.

U 2

For

292 A COMPLETE BODY

	l.	s.	d.
For ten horses at eight pound per horse.	80	0	0
Three dray-ploughs, without irons, at eight shillings each	1	4	0
Iron work to the feed ploughs, at eight shillings each	1	4	0
Collars and plough-harnes, at one pound per horse	10	0	0
Chains and whiple-trees to the ploughs, at ten shillings each	1	10	0
The wood work of four pair of broad-harrows, at six shillings each pair	1	4	0
For teeth or tines, for the said harrows, at four-pence per pound	4	0	0
Two wooden long roles, at twelve shillings each	1	4	0
Two wheat roles at ten shil- lings each	1	0	0
Three dung-carts with iron- shod wheels, at nine pound each	27	0	0
Two waggons at seventeen pound each	34	0	0
The timber work for four pair of shut harrows, at four shillings per pair	1	16	0
For teeth or tines for the said harrows	2	10	8
Timber work for two pair of barley shut harrows	0	6	0

Teeth

OF HUSBANDRY. 293

	l.	s.	d.
Teeth of iron for the said har-	0	12	8
rows			
Chains and coupling-links for	1	0	0
ten pair of harrows			
The wood work of six drag-	0	15	0
rakes			
Six pair of harvest ropes	2	2	0
Iron teeth for the said rakes	1	4	0
Chain harness for cart and wag-	12	10	0
gon, &c. for ten horses, at one			
pound five shillings per horse			
Six pair of iron winch pins	1	10	0
Three casting shovels	0	7	6
Three iron tipt shovels	0	7	0
Three shovels for water thorrows	0	4	6
Three spades	0	12	0
Four wicker fans for winnow-	0	16	0
ing of corn			
Two bushel measures	0	14	0
Forty sacks of six bushels each	7	6	8
Rakes, forks, and prongs, about	2	0	0
Scales and weights for the	3	0	0
corn, &c.			
Wyer-skreen, and wyer-sieve	1	10	0
to clean the corn			
For other necessary imple-	12	0	0
ments of husbandry, as specified			
above			

U 3

Four

294 A COMPLETE BODY

	l.	s.	d.
Four dozen oaken hurdles, of sawn wood, at four shillings per hurdle	9	12	0
For two hundred sheep at eight pound per score	80	0	0
Twenty pigs, at six shillings each	6	0	0
One hundred of poultry	5	0	0
Sum laid out for the farm	315	2	0

Besides this stock, we may reckon for the household-furniture and utensils } 100 0 0

So that in all, we must lay out upon the entrance of such a farm, without reckoning the tillage, the sum of

415 0 0

Which sum is not far short of three year's rent of a farm of one hundred and fifty pounds a year; and with the necessary provender to be provided for horses at first coming in, it would amount to full the sum of four hundred and fifty pound. But a farmer must still have money to go forward with his business for seed and work, before he will receive any profit; and then the household furniture may be set by it self, or not reckoned into

into the sum, and the hundred pounds may go towards tillage and sowing.

But let us now see the expence for tilling and sowing one hundred acres out of the three hundred, for one year, as the Essex way is. And these hundred acres must be divided into two parts; viz. fifty acres for Kentish wheat, and fifty acres for barley.

Colonel Bradbury, a gentleman I have often mentioned in this work, who is a proficient in this country way of farming, reckons the expence as follows ;

	l.	s.	d.
For four times ploughing one hundred acres of land, for tilt or tillage, at twenty shillings per acre	100	0	0
For dunging the said land at one pound per acre, the dung being our own, and allowing twenty loads to an acre	100	0	0
Seed for fifty acres of wheat, two bushels and half per acre, at five shillings per bushel, comes to	31	5	0
Four bushels of salt to brine the wheat, at five shillings per bushel	1	0	0
Lime for the seed, allowing half a bushel per acre, at sixpence per bushel: in all twenty-five bushels	0	12	6

U 4

For

l. s. d.

For sowing and water thor- }
rowing, at eight pence per acre } 1 13 4

For roling the wheat, four- }
pence per acre } 0 16 8

For reaping and binding the }
said wheat, at four shillings per } 10 0 0
acre

Allowance for carting the said }
wheat to the barn, half-a-crown } 6 8 0
per acre ; for fifty acres

WE come in the next place to sow fifty
acres of barley, the expence of which
is, viz.

Allowance for ploughing of }
fifty acres of land, now the fifth } 10 0 0
time, for barley, at four shillings }
per acre

Seed barley, four bushels for }
each acre, at two shillings and } 25 0 0
six pence per bushel

For sowing and water-thorow- }
ing, about eight pence per acre ; } 1 13 4
for fifty acres

For harrowing at six-pence per }
acre, the fifty acres come to } 1 5 0

For roling the said fifty acres, }
at four-pence per acre } 0 16 8

For mowing fifty acres of bar- }
ley at twenty pence per acre } 4 3 4

For

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l. s. d.

For gathering or getting the
barley together fit for carting, } 2 10 0
one shilling per acre

Allowed for carting the barley
to the barn, at two shillings and } 6 8 0
fix-pence per acre

So the charge of the tilt or til-
led crop upon one hundred acres
is

303 11 10

Profits arising by the first crop, upon one
hundred acres of land ; fifty acres sown
with Kentish-wheat, and fifty sown with
barley.

Produce of fifty acres of Kent-
ish-wheat cleaned for the market,
the tyth paid, about sixteen bush-
els each acre, at five shillings per
bushel } 200 0 0

Produce of fifty acres of bar-
ley, cleaned for the market ; the
tithes paid about five quarters
to each acre, at one pound per
quarter } 250 0 0

Value

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Value of wheat straw and chaff
from fifty acres, which is com-
monly allowed by the farmers
for inning and outing of the corn,
as the farmers call it, which is the
expençe of cutting, harvesting the
corn in the field, and bringing it
to the barn, and for thrashing,
dressing, and carrying it to market

50 0 0

Straw and chaff, from fifty a-
cres of barley, as before allowed
for the wheat

50 0 0

Income of one hundred acres of
tilled land

350 0 0

Etche crop upon one hundred acres, the
first year of taking the farm ; for accor-
ding to the custom of the country, there
must be one hundred acres of stubble to
plough up, left by the late tenant, which
is called an etche.

Allowed for ploughing one
hundred acres of stubble, or etche,
in January or February, at six
shillings per acre : this work be-
ing much harder than the plough-
ing of the tilled land

30 0 0

Seed

l. s. d.

Seed for fifty acres of pease,
to be sowed upon the barley
stubble, at two shillings and six-
pence per bushel, allowing three
bushels per acre. } 18 15 0

To the seedman, to sow the
pease at ten pence per acre, and
making water-thorrows. } 2 1 8

Harrowing and dressing, one
shilling per acre. } 2 10 0

Rolling the said land, at six
pence per acre, because of the
difficulty of the stubble. } 1 5 0

For hooking and wisping up
the crop, two shillings per acre. } 5 0 0

For carting, at two shillings
per acre. } 5 0 0

Expence of fifty acres of pease. 64 11 8

Pease straw about 20s. per acre, oat straw
and chaff, about 11 s.

Expence of sowing and gathering fifty acres
of oats upon the wheat stubble, the
ploughing of the same being reckoned
in the foregoing article of the crop of
pease.

For feed oats, four bushels for
each acre, at two shillings per
acre, } 20 0 0

To

300 A COMPLETE BODY

	l.	s.	d.
To the feeds-man to water- thorow, and sow fifty acres of oats, at one shilling per acre	2	10	0
For harrowing and dressing 50 acres of oats for the etch-crop, at one shilling per acre	2	10	0
For rolling the said fifty acres, at six pence per acre	1	5	0
For mowing fifty acres of oats, at sixteen pence per acre	3	6	8
For gathering fifty acres of oats, at eight pence per acre	1	13	4
Carting, two shillings per acre for fifty acres	5	0	0
	<u>36</u>	<u>5</u>	<u>0</u>

To which we may add the
expence of the fifty acres of
pease

And then the whole expence
of the hundred acres of etche
will be

Account of the income by the hundred
acres of etche crop of pease and oats,

By fifty acres of cleaned pease,
allowing three quarters to each
acre, the tythes paid, at one
pound per quarter.

By

OF HUSBANDRY. 301

l. s. d.

By straw or haulm, allowed
for the work in the field, bring-
ing home the pease, thrashing,
cleaning and carrying to market,
about two load to each acre } 50 0 0

By fifty acres of oats, allow-
ing three quarters per acre, at
twelve shillings per quarter } 90 0 0

By straw and chaff allowed for
inning and outing the oats } 50 0 0

Full profit of the etch-crop. 340 0 0

We must in the next place come to shew
the profits arising by our live stock, viz.

The produce of two hundred
ewes, to be reckoned at five shill-
ings each } 50 0 0

Profit of twenty hogs by a
years keeping, clear of their first
price, will be about twenty shil-
lings apiece } 20 0 0

Profit by the poultry, tho'
that is generally belonging to the
mistress of the farm; or else to
be used in the family, which is
still profitable, about } 40 0 0

Young

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Young horses, which are improving, will answer all necessary physick, dressing, and keeping, without reckoning the advantage of this.

	l.	s.	d.
Increase by the live stock			
in one year, about	110	0	0

WE are in the next place to state the account, that we may see the gain of the farmer. In this case we are not to reckon the expence of the utensils of the farm, but the expences and profits only as they are yearly upon one of the Essex estates. For the stock of utensils, the farmers tell us keeps it self, there are ways of maintaining the repairs of that which are not regarded; besides, we have not reckoned the wool of the sheep, and some other good profits which are often set towards housekeeping and repairs. The stock of implements is bought in, and when a farmer leaves off, or changes his farm, this stock is sold at a good rate; for the farmer must keep all the particulars in repair for his own use: so there is nothing to say against these, but that they are second-hand goods, unless a farmer has been careless and neglected them, and then he will find the disadvantage of his neglect; for such a stock, if it is not duly taken care of,

of, will soon run to ruin, and will then sell for very little. But the careless man is not fit for a farmer, he must be vigilant and industrious, and must be up early, and his farm will pay him well for his trouble, and his stock will always be profitable to him when he has a mind to dispose of it. But we now come to reckon the expence and profit of a farm of one hundred and fifty pounds per annum, consisting of three hundred acres, viz. one hundred till'd or tilt, one hundred etche, and one hundred fallow ; the stock of which farm is four hundred fifteen pound.

Ex-

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	l.	s.	d.
Expence of an hundred acres tilled crop	303	11	10
Expence of an hundred acres of etche	100	16	8
Rent	150	0	0
Wages of three men, at six pound per ann. each	18	0	0
Wages of three boys, one at three pound per ann. for the head team, and two at forty Shillings per ann. each	7	0	0
To a shepherd, fifty shillings per ann. and the keeping of four sheep, in all worth	7	0	0
Expences	586	8	6

Profits of the said farm, by wheat, barley, chaff, and straw, from an hundred acres of tilled land	350	0	0
Profits of one hundred acres of pease and oats, with straw and chaff, on the etche crop	340	0	0
Profit by sheep	50	0	0
Profit by fwine	20	0	0
Profit by poultry	40	0	0
Profits	800	0	0
Expences	586	0	0
Clear profit in one year	214	0	0

Thus

THUS we see the profit of an Essex farm of three hundred acres, and it may yet, in my opinion, be reckoned more profitable by much than is here set down; for what is reckoned for ploughing and tilling, is done by our own horses and servants, whose keeping is accounted for: and moreover, the horses may gain a great deal by carriage of timber, or other things. But to proceed, I am in the next place to give an account of a grass farm, and the stock for it, whether it be meadow or pasture, or both together. We may observe, however, that a Middlesex farm will produce above as much more; for there the ground never lies idle, but is always bringing some profitable crop or other.

*Expence of stocking a Grass-Farm,
where there is both Grazing and
Meadow Ground; with an Ac-
count of the Profits that may a-
rise by it, to be ordered after
the Essex manner.*

WE shall here suppose an estate or farm consisting of fifty acres of meadow, at forty shillings per annum for each

X	acre,
---	-------

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acre, and one hundred acres of pasture, at one pound per acre; in all two hundred pounds per annum.

The hundred acres of pasture may either be converted to the keeping cows for the dairy, or else for feeding of oxen for the butcher. But we shall begin with the first.

	l.	s.	d.
For the stock of one hundred acres of pasture we must allow seventy three cows, after the rate of an acre and half to each cow; which supposing them to be bought at five pounds each, will cost	265	0	0

Then the expence of the utensils of the dairy will be as follows.

Six milking-pails, with iron hoops and bails, about five shillings a piece; these pails should be made of ash.	1	10	0
--	---	----	---

Three cheese-tubs, to hold about fifty gallons a piece; to be made of ash about fifteen shillings each.	2	5	0
---	---	---	---

Three stands to set these tubs upon, at ten shillings each.	1	10	0
---	---	----	---

One large barrel-churn and frame, about	2	10	0
			One

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	l.	s.	d.
One upright or hand-churn, about	0	7	0
Three leaden cisterns to set milk in, with frames to them, at about three pounds each	9	0	0
Four cheese-presses, at about thirty shillings each	6	0	0
Twenty four cheese-moots, or cheese-fats, about five shillings each	6	0	0
A copper to warm the milk in	5	0	0
Twelve earthen pans for the cream, at about two shillings each	1	4	0
Two straining dishes or sives, about one shilling each	0	2	0
A cheese-ladder for straining the milk	0	1	0
Six fleeting dishes or skimming dishes, at six pence each	0	3	0
Cheese cloaths and turning cloaths, two dozen of each sort, about eight pence each	0	16	0
Four double hanging shelves for cheeses, at ten shillings each	2	0	0
Twelve milk-pans, to set the milk in when the dairy is low, at six pence each	0	6	0

X 2

And

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l. s. d.

And in the cheefe chamber,
four large hanging double shelves, } 2 0 0
at ten shillings each

To attend this dairy, one man and three
maids are sufficient, according to the rule
of the North part of Essex.

When we employ our hun-
dred acres of pasture for this use,
we may allow ten fows, and one
boar for breeding, which will cost } 13 15 0
about one pound five shillings
each

Amount of the whole charge
of stocking this farm

319 9 0

Or else we may stock our yard with pigs,
to rear or bring up, which we may buy in
at six shillings each, which may be sixty in
number; tho' the general allowance is a pig
to each cow.

And as for poultry, we must not pre-
tend to keep many, for what they will find
on the dairy account will be very little; a-
bout twenty breeders will be enough.

It is to be noted also, that whatever farm
is designed to be laid down for grafs, should
be well watered; either because we may
water it, if it is laid down for mowing, or
else that cattle that are fed upon it may
have plenty of good water, not in standing
ponds

ponds only, but in running streams, if possible; for standing waters are apt to be full of insects in summer time, and are unwholesome in the very time when they are most wanted. In the year 1714 the drought of the summer was so great, that all the ponds of standing water were dried up, and the cattle in such places as wanted water, or where the water was over-heated, first caught a distemper which was equal to the plague; so that many thousand cattle died that year by communicating the distemper to one another: but it was observable that where the cattle had the benefit of clear running streams, they preserved their health. This I have treated of pretty largely in my chapter of blights, in my new Improvements.

It is also of great advantage to these kind of farms, to have several enclosures, as I have hinted before in my chapter of the improvement of lands by enclosure; and as may farther be remarked from the following paragraph of Mr. Fitz-Herbarde's, which relates to the several sorts of cattle, which may go together in one pasture, or may follow one another in the same pasture.

Beastes alone (oxen or kine) nor horses alone, nor sheep alone, except it be sheep upon a very high ground, will not eat pasture

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sture even, but leave high grass in divers places, except it be stocked with cattle; wherefore know that horses and beasts (oxen or kine) will agree well together in one pasture; for there is some manner of grass which a horse will eat, and a beast will not eat. But horses and sheep will not so well agree, except it be sheep to feed (fat) for a sheep will go on a bare pasture, and will eat the sweetest grass; and so will a horse, but he should have the grass longer; howbeit, he will eat as nigh the earth as a sheep, but he cannot so soon fill his belly. To a hundred beasts ye may put twenty horses, if it be low ground, and if there be grass enough, put in a hundred sheep, and so after the rate, if the pasture be more or less; and so after this manner ye may eat the close even, and leave but few tufts; and if it be high ground, put in mo (more) shepe and less beastes and horses.

Milch kye (kine) and draught oxen, will eat a close or croft much barer than as many fat kye and oxen; and a milch cowe may have too much meat, for and (if) she waxe fatt (grow fat) she will the rather take the bull, and give less milk; for the fatness stoppeth the pores, and the wayne (vein) that should bring the milk to the pappes; and therefore mean grass (moderate feed) is best to keep her in good estate for milk. And

If a cow be fatt when she shall calve, then there is great jeopardy in her (she is in danger) and the calf will be the less; but ye cannot give your draught ox too much meat, except it be the aftermath (rowen) of a low mowen meadow, for that will cause him to be faint and weak, and then he may not well labour. And (if) there be too much grass in a close (if the grass be too long) the cattle shall feed a great deal the worse, for a good bite to the earth is sufficient; for and it be long the beastes will bite off the top and no more, for that is sweetest, and the other lyeth still upon the ground and rot-teth, and no beast will eat it, but horses in winter.

But the beastes, horses, and shepe may not be foddered together in winter, but must be separated, or else the beastes with their hornes, will butt both the horses and the shepe, and goze them in their bellies; and it is necessary to make standing crotch-es (racks) to cast their fodder in, and the staves set nigh enough together to hinder their pulling their fodder too hastily out, and shedding it; and if it be laid upon the earth, the fourth part thereof will be lost: and if ye laye it upon the earth, laye it every time in a new place, for the old will marre (spoil) the new.

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To these old rules we may add, that where there are many distinct pastures, by shifting the cattle, the grafs will not be so much spoiled by the trampling of the cattle, and sheep may follow the kine to a good purpose.

Let us now see the expence of this stock for one hundred acres, to be employed for dairy use.

	l.	s.	d.
For seventy three cows, at five pounds each	265	0	0
Charge of the implements of the dairy	40	14	0
Ten breeding sows, and a boar, at one pound five shillings each	13	15	0
So the price of the stock is	319	9	0

In the next place we come to set down the yearly expence of one hundred acres of pasture, viz.

Yearly rent	100	0	0
Wages for one man per annum	4	0	0
Wages for three maids, at three pounds each	9	0	0
	113	0	0

I SHALL

I SHALL now proceed to set down the profits which are generally allowed about the North of Essex, in such a farm where milk is not in the way of being sold for above a penny per quart, at the dearest time of the year, and is therefore manufactured either into butter and cheese, and fleet milk and whey, disposed of for the feeding of hogs ; or else the milk to be used for suckling and fattening of calves.

The common way of reckoning the profits of cows in this part of Essex, is at three pounds per cow per an. so that then seventy-three cows will yield in one year

} 219 0 0

From these cows we may expect seventy three calves (for they breed but once a year, a cow going nine months with calf) which may be kept till they are a month old, and then sold from the farm, for about one pound each, which will come to seventy-three pound ; which is generally allowed to answer the charge of wintering the cattle : viz. to pay for straw, &c. but this is rather too much.

Profit

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l. s. d.

Profit by pigs from the ten
fows, which will farrow twice in
a year (they going with pig a
few days above four months) so
that we may expect two fares of
pigs in twelve months; and al-
lowing nine pigs to each sow,
every time she farrows, there will
be ninety of the first fare, which
being sold at half year old, may
be worth about twelve shillings
a piece at the same farm, which
comes to

54 0 0

Second fare of pigs, at half
year old, being likewise about
ninety in number, at least to be
sold as the former, though some
times worth fifteen or sixteen
shillings each

54 0 0

The whole value of this, then
comes to

327 0 0

From which sum if we deduct
the former expences of rent, and
servants wages: viz.

113 0 0

There will be clear profit

214 0 0

To this might be added the advantage
that may be made of sheep, to follow the cows
in the same pasture. But as I shall menti-
on

on that in the following way of stocking a farm with feeding and fatting cattle; the profit of sheep there, may be joined with this, as well as the expence of them, so that a ballance may be made; and this may then appear of a much greater value than it is set.

WE must suppose also, that in the value of the produce from these cows, the butter and cheese made from them, is not sold at the dearest rate; for in such farms, the butter, at the time of the full dairy, is often potted up at three-pence, and sometimes less per pound, and the cheese sold from three-half-pence to two-pence per pound; and even then the cows will make more than the value of three pounds per ann. each. Or if we were to feed or suckle the calves for the London markets, so that they might yield about three pounds or fifty shillings apiece; yet we should soon find that neither of those prices for them would countervail the expence of fatting them: but this is seldom practised, but where there is no vend for the milk, or the expence of furnishing a large dairy with utensils, is not thought convenient; for these calves must be housed and suckled with a great deal of care, for three months, before they will be fat and fit for sale, and thereby destroy near as much milk as they are worth, besides the value

value of themselves as calves ; so that as I observe, the profit by them is only where milk cannot conveniently be sold, or the dairy business is not worth the while of the farmer to undertake, or within the reach of his farm. We shall in the next place, enquire after the manner to be used for stocking one hundred acres with cattle, for feeding and fattening for the markets.

Method of flocking a farm with cattle to fat for the markets.

When we go about stocking a grazing farm of one hundred acres, the common allowance for summer feed, is one beast to an acre and half, so to a hundred acres, there must be seventy-three beasts either steers, heifers, or bullocks, to be bought in any time, from the beginning of April to the end of May, and not later. These cattle should be such as will answer the weight of seventy-five, or eighty stone each beast, when they are fat, at eight pounds each stone. The time we allow for fattening these cattle, is four months; and the first price of them is about four pounds per beast, which for seventy-three, comes to

When

When these are sold off the ground will lye idle till October, and then we must stock it with small cattle, such as are brought from Scotland or Wales, about that time of year. To each of these we must allow three acres for winter feed: besides now and then a little hay in hard weather, to keep them from licking themselves, which they are apt to do, as soon as they rise from Laire to their hurt, by bruising themselves, which makes them waste and grow lean. These will be fit for sale about February, and will then weigh about forty or fifty stone a piece, at eight pounds to the stone: but we shall suppose forty stone only, which at two shillings per stone, will come to about four pounds each beast. These cattle are bought in at about forty-shillings a piece, and the number for one hundred acres, is thirty-three, which comes to

66 0 0

At

l. s. d.

At the same time to follow these small cattle, buy in sheep to eat up the remaining part of the herbage, allowing two large wethers to each acre, which must be bought in very forward, or fat ; for if we take them from the fold or the fallows, these pastures will give them the rot. In the purchase of these it is not pretended that our pasture should fat them, but only keep them till they will sell well at market, which will be the February following. Of these must be two hundred, to be bought in for about fourteen pounds per score, which comes to

140 0 0

The whole of this charge will be 498 0 0

Profits that may arise by this stock.

Value of seventy-three steers, heifers, or bullocks, after they have had four months feed in the summer, after the rate of eight pounds per beast

584 0 0

These will feed best where the lands are enclosed ; for then the cattle will not hurt the grass by trampling, and fresh pastures will help to fat them.

Value

l. s. d.

Value of thirty-three small
 bullocks for winter feed, when
 they go to market in February,
 at four pounds each } 144 0 0

Value of two hundred fat we-
 thers, after the winter keeping,
 to be sold in February, when
 mutton is at the dearest, after
 the rate of twenty pounds per
 score } 200 0 0

For we must note that all our pastures
 should be clear of cattle, by the beginning
 of March, or the middle of that month
 at farthest, according as the season is for-
 warder or later ; for if the cattle were left
 long enough to nip or bite the young spring
 of the grafs, it will weaken and spoil the
 summer crop of grafs.

The whole value of the afore-
 said cattle, amounts to, when we
 sell them 928 0 0

From which sum we must take
 the price we paid for the cattle,
 when we bought them in, which
 amounts to four hundred ninety-
 eight pounds ; and one hundred
 pounds for the year's rent, which
 amounts to } 598 0 0

Which

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Which sum, being deducted
from the above 928, there will
remain profit

330 0 0

Expence and profits of fifty acres of meadow ground, in the Northern parts of Essex.

It is generally computed, that an acre of meadow land will bear one year with another, about forty hundred of hay, which is two load; this is the first crop, and is commonly taken off by the end of May, if the spring be forward. This is worth about two shillings per hundred, or one shilling the truss in the field, which comes to four pounds per acre; and in all amounts to

100 0 0

The second crop, or rowin, or aftermoth, or after-feed, or fogg, for they all mean the same thing, may be converted into hay for sheep, being very proper for them, but apt to make horses faint, though cows I have known have been fed with it, and they have done very well. Of this we may expect about a load upon an acre, which must be well

50 0 0

dried

dried and tedded very well. This will be worth about one pound per load, and is commonly carried in by Michaelmas, fifty load of this at one pound per acre, comes to

In all 250 0 0

Expence of the fifty acres of meadow,
for cutting, &c.

For mowing the first crop of
fifty acres, at two shillings per
acre, at a medium price } 5 0 0

Mowing the second crop } 5 0 0

For making the hay, at sixteen-
pence per acre } 3 6 8

Making the second crop at ditto
per acre } 3 6 8

Rent for fifty acres of meadow 100 0 0

Total expence of making and
tedding the hay, with the rent 116 13 4

Which sum being deducted out
of two hundred and fifty pounds,
there will remain clear profit, if
the hay is sold in the field } 113 6 8

Or if it is carried home and
stacked, three shillings per acre
is allowed for carting and stack-
ing, which for fifty acres amounts
to } 7 10 0

Y

Which

322 A COMPLETE BODY

Which sum being taken from
 one hundred and thirty-three l. s. d.
 pounds, seven shillings and eight-
 pence, there will then remain
 profits only

125 17 8

IN the next place let us see the profit
 that may be made by leaving the rowen un-
 cut, for feeding in the winter with cattle.

About Michaelmas we may
 stock these fifty acres with cattle,
 in the same proportion we did the
 pasture-land, and sell them the
 February following at a good
 market, the number then will be
 about eighteen, and must be large
 bullocks, worth about four pounds
 apiece, or better, when they are
 bought in, which comes to

72 0 0

At the same time we may buy
 in a parcel of fat wethers, to be
 sold out in February, allowing
 four to an acre; for this grass is
 doubly as good as the pasture
 ground, so that the fifty acres
 will require two hundred sheep;
 to be bought in at about fourteen
 pounds per score, which comes to

140 0 0

In all the expence of cattle

212 0 0

Va-

Value of the cattle after the winter's feed
upon fifty acres of meadow ground.

	l.	s.	d.
Value of eighteen bullocks, after the winter's feed, at eight pounds each.	144	0	0

Value of two hundred weathers at February after the winter's feed, by reason of the high price then given for mutton in the markets, about twenty pound per score.	200	0	0
--	-----	---	---

In all the value will come to	<u>344</u>	<u>0</u>	<u>0</u>
-------------------------------	------------	----------	----------

Out of which take the first price of the cattle, viz, two hundred and twelve pounds, and there will remain	212	0	0
--	-----	---	---

Clear money or profit by the winter's grafs	<u>132</u>	<u>0</u>	<u>0</u>
---	------------	----------	----------

We may next observe which is the most advantageous of these two ways of managing the fifty acres of meadow ground, in a short view.

Y 2

First,

First, of the profits by the first and second mowing of fifty acres.

	l.	s.	d.
Expence for making or tedding of the first crop of hay	8	6	8
Expence for making or tedding the second crop	8	6	8
The rent	100	0	0
Expence	116	13	4

By hay of the first crop, two load upon an acre, in fifty acres one hundred loads, at forty shillings per load } 200 0 0

By hay the second crop, a load upon an acre, worth one pound per load ; so fifty loads come to } 50 0 0

Whole value of the crops	250	0	0
Expence	116	13	4
Remains profit	133	6	8

Where this method is used of cutting the two crops of grass in one year, the grounds are generally over-flow'd, or lye under water in the winter, and then cannot have the benefit of feeding with cattle. But we will see now the advantages of reaping only the first

OF HUSBANDRY. 325

first crop of hay, and feeding the winter-grass.

Profits by the first mowing of fifty acres of meadow, and feeding of cattle in the winter.

	l.	s.	d.
Expence of making or tedding the first crop of grass	8	6	8
For eighteen bullocks for the winter grass, at four pounds each	72	0	0
For two hundred wethers, at fourteen pound per score	140	0	0
Rent	100	0	0
	<u>320</u>	<u>6</u>	<u>8</u>
By hay of the first crop upon fifty acres of meadow, as in the former account	200	0	0
By eighteen bullocks, sold at eight pounds each	144	0	0
By two hundred sheep, sold at twenty pounds per score	200	0	0
Whole value	544	0	0
Expence	<u>320</u>	<u>6</u>	<u>8</u>
Remains profit	223	13	4

From these accounts one may judge of the different profits which are made of the same number of acres of meadow.

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The first is by hay, only clear } l. s. d.
profit } 133 6 8

The second is by the first crop
of hay, and the feeding the win- } 223 13 4
ter grafs, clear profit.

So that there is more profit by one, than
the other, as we shall see by taking the
lesser sum from the sum of 223 13 4

So that by feeding the winter
grafs of the meadow, there is
more profit than by mowing, the
sum of 90 6 8

Let us now see the profits of the three
farms, viz. three hundred acres of arable,
one hundred acres of pasture, and the fifty
acres of meadow.

By the three hundred acres of
arable, the profit in one year is } 214 0 0

By the hundred acres of pa-
sture, the profits of one year by } 330 0 0
feeding of cattle will be

By the profits of fifty acres of
meadow, the summer grafs being } 223 13 4
mowen, and the winter-grafs fed

One year's profit by the whole 767 13 4

But

But in all these accounts we should make some allowance for accidents, as the death of some cattle, or bad markets, &c. In the buying and selling of cattle there is great hazard, and a grazier ought to understand them very well, and the ground likewise that he feeds them upon, or else he may soon run through his stock. In all these accounts I have been as particular as possible, for the better instruction of young farmers, that they may see as much variety of practice as possible. It will also be necessary to give him a view of the several weights and measures according to the standard; for neither measures nor weights are the same in all countries. In the measure of land, some make eighteen foot, and some twenty foot to the rod, or pole or perch; whereas sixteen foot and half square is the standard pole or perch. The London bushel is eight gallons, the Aylesbury bushel is nine gallons; some are eight gallons and half, others eight gallons and one pint, eight gallons and one quart, eight gallons and three pints, which should be had regard to, when we hear that corn is sold for five shillings per bushel at one market, and six shillings at another, and so at different prices at other markets; we should know what are the dimensions of the bushel measures at the several markets, or else we cannot judge of

the price of the corn ; and corn is also sold by weight in some places, allowing fifty pounds ; in others fifty six, and others sixty pounds to the bushel. Where a bushel is eight gallons and half, a sack of four bushels of Kentish wheat should weigh four bushels and half, as the farmers or the meal-men tell us ; that is, they allow fifty six pounds a-verdupois weight to one bushel, and the sack of four bushels must weigh two hundred fifty two pounds ; so that the miller when the corn is ground, gets half a bushel clear profit by every sack, besides other considerable profit, if he dresses his meal at home. The bushel of nine gallons, a sack of five bushels should weigh six bushel weight. The pound weight for butter is in some places of England eighteen and twenty ounces, tho' the standard is fifteen ounces ; even in the compass of a few miles there is a great difference : as for example ;

The measure of the bushel at **Safronwalden** is 8 gallons 2 quarts.

The measure of ditto at **Bishop-Stortford** is 8 gallons 2 quarts.

The measure of ditto at **Royston** is 8 gallons 1 quart.

The measure of ditto at **Lynton** is 8 gallons 1 quart.

The

The measure of ditto Hertford and Ware is 8 gallons one pint.

The measure of ditto at Epping, Rufford and Onger, is 9 gallons.

The measure of ditto at Malden, and by the sea-coast in Essex, is 9 gallons.

So in weights, the stone for meat at Saffron-walden is 14 lb averdupois, at sixteen ounces to the pound.

The stone at Bishop-stortford is 8 lb averdupois.

And in the weight of wool there is also a great difference. But I shall now proceed to the several tables of weights and measures according to the standard. A pound of wheat, Troy weight, or twelve ounces to the pound, is judged to fill a pint liquid measure; so that in a London bushel there are computed sixty four pounds Troy weight. But by the statute, a pint beer-measure now makes thirty five and one quarter solid inches, and twenty two $\frac{7}{8}$ solid inches in a wine pint, by which all liquid or dry measures are regulated, as for example will appear in the following tables of liquid and dry measure.

Table

Table of liquid measure.

35 $\frac{1}{4}$ cubical inches } makes	1 pint beer measure
28 $\frac{1}{4}$ cubical inches	1 pint wine measure
2 pints	1 quart
2 quarts	1 pottle
2 pottles	1 gallon
8 gallons	5 1 firkin of ale, soap 2 or herring
9 gallons	1 firkin of beer
10 gallons and half	5 1 firkin of salmon 2 or eels
2 firkins	1 kilderkin
2 kilderkins	1 barrel
42 gallons	1 tierce of wine
63 gallons	1 hoghead
2 hogheads	1 pipe or butt
2 pipes or butts	1 tun of wine.

Table of dry measure.

35 $\frac{1}{4}$ cubical inches } make	1 pint statute measure
2 pints	1 quart
2 quarts	1 pottle
2 pottles	1 gallon
2 gallons	1 peck
4 pecks or 8 gallons	1 bushel

4 bush-

4 bushels	5 1 comb, or bag, or 2 sack
5 bushels	1 market-load, or horse-load of wheat
2 combs, or 8 bush- els	1 quarter
4 quarters	1 chaldron
5 quarters	5 1 wey, or waggon- 2 load of corn
2 weys	1 laft

The table of long measure, whereby any length of distance is measured, is as follows.

3 barley corns make	1 inch
12 inches	1 foot
3 feet	1 yard
3 feet 9 inches, or 2 yard and quarter	1 English ell
$\frac{1}{4}$ of a yard, or 2 foot 3 inches	1 ell Flemish
5 feet	1 geometrical pace
5 yards and half, or 16 feet and half	5 1 rod or pole, or 2 perch in length
40 poles or perches in length	1 furlong

8 fur-

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8 furlongs, or 1056 }
geometrical pa- }
ces } 1 English mile sta-
tute measure

Table of superficial measures for land.

16 foot $\frac{1}{2}$ square in a piece of ground, which is square, and measures 16 foot $\frac{1}{2}$ on every side, makes	}	1 pole, or rod, or perch of field- measure for arable, meadow or pasture
18 feet square, as the former		1 pole, rod or perch, wood-land mea- sure
40 square poles, or perches	}	1 rood, or quarter of an acre
4 roods		1 acre

In some countries the rod or perch is on-
ly fifteen feet, but let the rod be what it
will, the acre contains always 160 rods.

Table for weights for wool, and other such gross commodities.

16 ounces make	1 pound
7 lb	1 clove
2 cloves	1 stone
2 stone	1 todd
6 todd and half	1 wey
240 pound	1 pack of wool or yarn

In

In Anglesey, and some parts of North Wales, five pound avordupois weight, makes a pound of wool.

The way in Suffolk is 236 lb avordupois, and the way in Essex is 336 pounds.

Thus we may observe many of the varieties both in weights and measures, and at the same time be acquainted with their several proportions, and their standards, which every dealer ought to be well acquainted with. We may also take notice, that in some places the bushel measure is heaped with corn, and then they say there is two strikes in a bushel. What they call a strike, is a bushel filled to the rim or brim only, and then passed over with a strait stick, so that no more corn may lie in it higher than the rim; so these strikes are like our bushels, and filled like them; but the filled bushel holds near twice as much as ours; but however the measure of the bushel is, or it is filled, the price of corn may be still the same in one place as in another, when we come to compare the measures of one place with the other. I may also observe, that in my remarks of the foregoing profits of farms, they are calculated for the bushels of eight gallons and half; so that when I direct two bushels and half to be sown upon an acre, it is not meant twenty gallons, according

according to the London bushel, but one and twenty gallons and one quart. And so when we read any of Mr. Mortimer's works, we ought to consider the measure of the bushel where he lives, which is nine gallons to the bushel, unless he mentions the London bushel: and regard ought also to be had of the measure of the pole or perch, when we speak of an acre; for was one to direct, for example, two bushels and half of grain at 9 gallons per bushel, to be sown on an acre measured by the fifteen foot rod, it would be too much. The acres I mention are all sixteen foot and half to the pole or perch, unless I speak of wood-land measure, which is eighteen foot to the perch.

I shall now proceed to observe what is the common profit of wood-land in the North of Essex, on a piece of ground where the rod is sixteen foot and half.

We will suppose one hundred acres of wood-land, and then there may be a fall every year of ten acres; these to be rented for the underwood only at five shillings per acre per annum, so that the whole yearly rent amounts to twenty five pounds. The product of these woods are chiefly horn-beam, black-thorn, and white-fallow.

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l. s. d.

The charge of felling and ring-
ing, or ranging the wood, is
eight shillings per acre; so that
the expence of felling ten acres is

4 0 0

To the woodward for his care
in looking after the wood, and
keeping up the fences, one shill-
ing per range of wood; there
being ranges or rings in an acre,
which is called stub money

4 0 0

Tythes 8 0 0

Years rent 25 0 0

Whole charge by the year 41 0 0

In ten acres of wood, at eight
rings in each acre, there will be
eighty rings, which to be sold
for one pound per ring will a-
mount to

80 0 0

From whence deduct forty
one pound, the expence of fell-
ing, and to the woodward, &c.

41 0 0

And there will remain clear
profit, without any expence of
carriage.

39 0 0

We may take notice, however, that the
clergy pay the stub-money for every ringe
or range of wood they have a claim to,
which is every tenth ringe.

Thus

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THUS we may see in sum the various improvements that may be made of land, and at the same time be apprised of the great expences a farmer must be at to manage and bring his crop to perfection: as to the stocking of farms, we have nothing that has yet appeared in publick that has given us any account of it, which made me the more willing to explain that particular as fully as possible.

C H A P. XVIII.

Of Horses.

THE horse being one of the most noble and serviceable beasts within the bounds of an English Farm, I think it necessary to observe some particulars concerning him; but I shall not pretend to direct what is beautiful in him, nor to describe the exact make of a fine horse; for every one, according to his own fancy, will find something pleasing to himself, and what he will approve of, whether it may be contrary to the opinion of other people or not. Several authors have taken the horse to pieces, as a noble creature worthy their observation, and described his beauties; but I find them differ in their opinions when they come to particulars, as men do in their judgment of men

men and manners: one delights in a running-horse, another in a hunter, another in a managed-horse; another likes a pad, another a horse of carriage; while there are others that want the use of an horse for the plough, the waggon, or the cart; and it is to be confessed, that for every one of these uses, the same make and structure of an horse, will not do. We chuse those which are for the most genteel and noble exercises, from those which are of a sound, well-made, and lusty breed, or, as some call it, from bred-horses; while the others, which are the offspring of cross strains, and of uncertain qualities, serve only for the meaner uses; tho' it happens now and then, that out of the base breed springs a colt, that by good management is brought to equal those horses which are of the most valuable race. It is observable, however, that a bred horse is not always admired for what we call his fine make and his soundness of body, unless he has been trained up to please us in his goings; and that is the business of a jockey, or horse-masters, who even in the management of an horse, whom few will admire for his make, and perhaps is unsound in his limbs into the bargain: even such an horse, by the jockey-art, will, by being brought to a handsome carriage, and a regulated way of going, and a few smart contrivances,

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trivances, make a good figure in the field for a little space; but that is not to be depended upon; so that in buying of horses there is a great uncertainty. The way therefore I would chuse, would be either to breed my own horses, or buy them colts in such places where the breed could be known, for that will give us the greatest surety of an horse's good principles; one may, by knowing the fame of the breed on both sides, pretty well judge of the good qualities; and as to the figure of our horse, what pleases us best will be always most agreeable. But however, a good judge of an horse should be consulted, to examin all the particular parts of such horses as we design to buy; to enquire into their soundness, or whether any accident has grieved them and diminished their strength; which faults may be overlooked by an unskilful person. When these things are concluded, we then come to the education, whereby an horse is taught to move with a good grace, and to behave well in the service we design to employ him; an horse fit for the menage, will require a vast deal of skill, and as much pains, to bring him to his exercises to do them justly; so that when he comes to a degree of perfection, his price will be greatly more worth than his natural perfections made him before he was taught; and in
bringing

bringing him to this discipline, I ought to take notice likewise, that the expence of the several instruments required to learn him his several motions, if he be tractable, or to restrain him, or correct his obstinacy, if he be otherwise, are not a little expensive: the cavefians in their several orders to be applied as the horse is more or less tractable, are of many varieties, and some of them of a good price. Some are very severe, and the use of them are so sharp, that none but ungovernable, or obstinate horses should have them applied; however, where a master takes upon him the instruction of horses, to teach them the menage, he must be provided with every sort.

BUT there are other devices which are used to bring the horses head in, and prevent his plunging, rearing, or running away; and likewise to make him carry his head in a genteel and easy manner, and that is by means of the musrole and the martingale; the cavefian has its effect upon the horses nose, so that by the stress of the rider's hand, his head is brought to his breast, and his obstinacy in flinging out his head, corrected, but the martingale and the musrole will, without any great trouble, bring him to a good carriage of his head in a few days, as some believe; 'tis therefore necessary to have of these, as well as many other

contrivances, relating as well to the saddle as the bridle: in the latter there are diversities in great number; were we to speak particularly of the bits, snaffles, &c. amongst which the french, the watering snaffle, the smooth cannon, the cannon of advantage, the cannon with the up-set mouth, the cannon with the flying trench, the plain scatch, the melon bit, the peare bit, the ball or poppy bit, the ring bit, and many more that have been, and are now in use; and, besides as auxiliaries, what is called the port, is used in the same cases, and the port is of different sorts; the checks likewise of the bridle are made various for different designs, and also the curb, or kirb, is not the same for every horse. Such a multitude of contrivances, besides many others, we have to teach an horse a genteel way of carriage; it would be endless to repeat them, but we must needs confess, that when an horse is brought to perform his exercise to perfection, he is certainly a creature to be admired before any that we have in use. And for its use in war, the master, as well as the enemy sufficiently experience the weight of such instructions.

AGAIN, horses which are not for the menage, may be brought to carry themselves well by other means: those we design for pacers or pads, must be brought to pace by means

means of the ~~tramel~~. The running horses, the hunters, all have their different ways of ordering and training up, which is the business of the jockey; and such as are the most heavy, are commonly used for the coach, for the waggon, or for other draught, which in some counties in England they are brought to very young, as I have known they have not been above two years old when they were put to work, and their labours were increased at three years to be equal with that of full grown horses. But I think at two years old they are much too tender for any work; a small strain at that time of day may be a means of spoiling them ever after: and considering what mischief may attend an horse by ill management, while he is even a colt, it is still the best to buy them in before they have been put to any labour at all, for then we may be the more certain of their soundness, and their goings or use may be directed as we best shall judge of their several capacities: or if we have conveniences of good grass, and good mares and stallion to breed out on, it will be much better to breed them our selves.

As for the colours of horses, it is generally allowed that white denotes a weakness in nature, and black carries more vigour and strength with it; the sorrel and the bay and chestnut, are equally commended for good-
Z 3
ness,

ness, and all the darker colours are judged to betoken strength; and they will not so soon shew any dirt they may get by labour, or in any of their exercises as the white will do, which in dirty or dusty weather, can scarce go a mile without being annoyed with one or the other. As for the pied horses, they are not now in request, though they were formerly; an horse of one colour, is to be preferred, and for that reason it is judged the best to have the stallion and the mare of one colour, if possible, that the colts may be the same: however, unless one of the two be white, there is hardly any danger of having a pied colt; for in all the creatures I have known the breed of, white dogs, rabbits, horses, birds or fowls, I have never known a pied race proceed from any of them, unless white has been a prevailing colour, either in the male or female, and then it is very rare to find the breed without such a mixture.

THE horse has been allowed to run with the mares, in some places, when they were only two years old; but though they will then couple, it is unadvisable to suffer them, for their breed will be weak and tender, neither the mare nor the horse, at that age, being come to their strength: however, at three years old, it is common enough to bring the horse to the mare; they are at that
time

time strong enough for coupling, and their offspring will have sufficient strength. And from three years to twenty and upwards, the stallion will be fit for service; but after that, I am of opinion, an horse begins to decay, and the colts he gets, must decline in goodness; though there are stallions in England, of near thirty years old, that are kept on purpose for the service of mares; yet the strongest colts must surely be got, when both the sire and the dam are in their greatest strength and vigour.

It is supposed that an horse ought not to serve above twenty mares, and some are of opinion he ought to have no less than sixteen, if he was to run with them in the field. As to the number twenty, which is the most they allow for an horse each season, it is certainly enough; for it is found by experience, that if he has more, the latter colts will be weak and unthrifty: however, this allowance ought to be regulated according to the strength and state of the horse. But as I have mentioned the age of the stallion for generation, so it will likewise be proper to speak a little further of the mare, and till what age she will bring strong colts: though she will take the horse at two years, yet it is, as I observed before, not to be admitted till three years, for it would weaken her too much, and she may

Z 4
bring

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bring good strong colts from that time, till she is ten years old; and after that, I know several that are of opinion, the colts she may bring forth decline in strength; however, I have seen a mare that brought a colt when she was eight and twenty years old. A mare goes with foal eleven months, and they foal in the twelfth.

THE age of the horse is known by his teeth; those teeth which declare his age, are called in greek *γνώμονες*; and when those teeth are gone, his age being uncertain, he is the worse for sale. Aristotle tells us, that an horse has forty teeth, and that in the thirtieth month after foaling, he casts four of them, i. e. two above and two below; and that in the beginning of his fourth year he casts four other teeth, two above and two below; and that when he is full four, and going into his fifth year, he casts all the rest. Such teeth as come in the room of those which he sheds, come up hollow, and when he is near six years old, the hollowness in his first teeth is filled up; and in the seventh year the hollowness of all the teeth is filled up; after which time, there can be no guess made of his age by the teeth. It is now the custom to judge of the age of any horse by one single tooth, which has a little black speck on it, and when that speck is quite gone, the horse is full seven years old. But there

there are some artists will burn a speck, and thereby deceive ignorant people; but we shall find by the length of the other teeth, which are filled in the seventh year, and will be much longer in an old horse, than any other; whether there is a fraud or not, when the black speck is gone, it is said the mark is out of the horse's mouth. Palladius tells us, that when a horse begins to grow old, his temples lie hollow, the hairs over his eyes become grey, and his teeth long. And we are informed by Aristotle, that the age of all four-footed beasts may be known by the skin of their jaws, which if we pull up, and is presently let fall again, it will lie in wrinkles, if the horse be old; or presently fall smooth, if it is a young horse.

A mare is at her full growth at five years old, and an horse continues growing till about his seventh year.

THE best time for the mares to run with the horse, if they are suffered to be abroad together, is in April and May; but sometimes all the mares will not take the horse in these months, and, perhaps, some not till August. But it is certainly best to have the mare covered at such a time when we may expect her to foal in the best season for grass, and to have enough of that before winter, for then the colt will thrive apace;

pace; and on the contrary when there is little nourishment the first year, the colt will be small: for it is found by experience, that to stint any creature in meat during the time of its growth, and in a colt especially, will prevent its growing; so that they will not be near so large as those that have been well nourished in their growing time. But it is thought by many, that 'tis better to keep the stallion in the house, and to bring him to the mares as occasion requires. Where the stallion is kept in the stable, he must be well fed, and he will serve more mares than if he was to go among them in a pasture; and besides, your horse being kept in the house, will run less hazard of being spoiled by the kicking or striking of the mares, for when a mare is once pregnant she will not suffer a horse to come near her.

WHERE conveniency serves, the mare may be kept in the stable a month or two before we give her the horse; for where the diet of the male and female has been alike for some time, there will be more certainty of the conception in the female after coupling. It is also thought convenient to bleed your mares about a week before you bring them out to be covered, taking from each mare about two quarts of blood; that

is,

is, bleed each mare on both sides the neck, taking out of each vein a quart of blood.

IN the breeding countries, or where stallions are kept to be in the house to be let out, they have one side or both sides of the stall boarded up; and in the boarded part, at a convenient height, there are little doors to be opened at pleasure, each door large enough for the horse to put his head and neck through, bringing to one of these the mare for the horse to smell on, by which they presently discover whether the mare will stand to the horse or not without striking him. If they find the mare willing to stand to the horse, they lead her into some open place, free from rough loose stones, or bushes, or timber, and lead the horse out to her, most commonly with two reins; for one man, perhaps, may not be able to manage him, and let the horse cover her. When the stallion is dismounted, 'tis a common custom to throw a pail of water on the mare, that by the coldness of the water the parts may be restrained, by which means they imagine the mare will hold the better for conception. The morning is generally thought the best on this occasion, suffering the horse to drink but little over night; but I speak of those who are very curious in this affair, for where this nicety is not so strictly observed, I have known fine breeds

breeds of horses. Some likewise trot the mare down hill, or some declining place, immediately after covering, thinking thereby to help her in conceiving; but I cannot discover the necessity of that practice. Others, as soon as a mare is covered, will return her again to the stable, and continue the same dyet as she had before, three weeks or a month longer, about which time you may see whether she is pregnant or not; for if she is not she will soon discover it, if she be brought again to the horse, that is to the same place on the side of his stall where we brought her before; and at the same time take care she does no mischief with her heels, for if she stood right to the horse at the first, she will be very froward and unlucky.

SOME again are so careful, that they take pregnant mares into the house about September, and let them continue there till they foal, feeding them every now and then with mashes, and such like moist food, till they can have plenty of grass abroad. But this certainly contributes to weaken the colts or fillies, which ever they are, and wou'd make them so tender, that they will be ever after subject to colds and rhumes. It is a maxim, that whatever creature is bred hardy, will be the stronger of body, and be the least subject to distemper. In the affair of horses,
what

what creatures are more hardy, and will endure more labour, than those which are bred upon the forests and mountains, without any care? but as they find there but a small share of nourishment, so they are but small in stature, and are more difficult to tame than others that have been more acquainted with mankind. A farmer, perhaps, when a mare has foal'd, will take her into the stable a night or two, and give her a good feed of oats, good grass, or the best hay; and we find these do as well as the other.

IT is necessary when a colt or filly is a little grown, so that 'tis near the time to wean them from the dam, to begin to use them to feed at the hand, and make them a little familiar; for we cannot make a horse too tame, and the more we use them to us, the tamer they will be, and be managed and brought to order with less trouble: a mare especially should be trained to gentleness, if we design her for breeding, and there are few but what we shall suffer to breed sometime or other; and if they are wild when they are with foal, they run great hazard of flipping their foal, by leaping of fences or ditches, or doing themselves damage otherways.

THE time for weaning of colts is best about the beginning of February, and be sure

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sure keep then your colts from hearing or seeing the dam, for they will pine, and the meat they eat will yield them very little nourishment; but as I observed before, let them be well nourished while they are growing, to make them large and strong. If a colt happens to be unruly when he is first taken up, keep him from meat, except such as he will take from the hand, and that will make him familiar by degrees; or if he is not to be mended by that, the only way is to prevent his sleep. But to prevent all this, is to begin to feed him before he is weaned, as I have already recommended, if we breed the colt our selves.

AMONG the ancients it is reported, that in this creature there is great regard to kindred, as that a colt will not cover his own dam, and tell us some stories to prove it; particularly, that some particular dealer in horses who made the experiment, by putting something over the eyes of his horse, brought him to his own dam, which he then covered; but immediately his blind being taken away, he perceived what he had done, and kicked his master; but I very much question whether the man suffered on that account or not, it might as well be, because his master had blinded him. As for other beasts and cattle we experience they make no difference; and it is

not difficult to try whether the horse has that regard or not. There are many things likewise which are related by the ancients, concerning the best time of the moon for covering of mares, and for sowing or gathering plants; but I have no faith in that, having tried many experiments which have not answered: I suppose all the lunary directions which I find, even in our times, possess some people, were first taken from the Egyptians and the eastern people, who in the first times reckoned by the moon only, and not as we do now, and then we may conclude, that as the whole course of the moon made a month with them, when they gave directions for any thing to be done, which required rather the middle than the beginning of the month, they would say, let it be done in the full of the moon, which was the middle of their moon or month; or any thing to be done at the beginning, they would direct it to be done about the new moon; and so likewise of any thing towards the latter end of the month, in the decrease of the moon. Others after them direct us to do such and such works at the rising or setting of some particular star, which is still to the same purpose, as we say now, plant any thing about such a part of the month, or let our mares be brought to the stallion about the mid-

middle or beginning of any particular moon or month; these have all the same meaning, 'tis only to specify the time or season when things should be done, without laying a stress upon any particular influence the moon or any of the stars have upon any thing which is done; but we find in the Egyptian accounts, when they are very particular, we have the certain day of the moon accounted for. But to return to my point of the breeding of horses; some are fond of letting the mare take the horse every year, while others only suffer a mare to breed every other year, which I think much the best, if we would have our foals strong and lusty. For the more strength the mare has when she is with foal, the stronger and better nourished will the foal be which is nourished by her, either in the womb, or afterwards to be suckled by her; so that we may suppose after she has rested some months from breeding and suckling, she must be stronger than if she was to breed immediately after she had foaled, and consequently such a foal will be the stronger; but indeed where people only covet to raise horses for the market, the more they have, the more money they get; but to breed a horse for one's own use, the stronger the stallion and the mare, the stronger the
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foal will be, and the better service it will do us.

THE lust of the mare is very remarkable when she desires the horse, in that she will suffer her self to be covered by an ass, which is a creature differing very much from one of her own species; however near enough ally'd in some respects to impregnate the mare, and this mixture will give us the creature called the mule or moyle, which, I think, more resembles the sire than the dam. But yet we find there is that difference in nature between the mare and the ass, that the mule which is produced from them, cannot produce any more of its kind, tho' they are very much addicted to venery, and couple frequently; so that to encrease the number of mules, there are mares kept on purpose in Spain, and the adjacent countries. The mule is a creature of great strength, fit to carry large burdens, and very sure footed, clambering up the steepest and most stoney mountains, without making the least false step; and as it is a beast able to endure the hardest labour, I much wonder we have so few of them in England. It is remarked by some who have formerly writ of this cross strain, that the mule is not brought forth till the twenty second month after copulation, which is about twice as long as a mare goes with

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the foal of an horse, but this I do not give as fact; for it is a doubt with me, whether the mare can bear to go longer by so many months than her usual time, without being extremely weakened by it, even so as to destroy her. But this would admit of a great deal of argument if it was true, which yet being uncertain, I shall drop it, and continue some observations relating to the mare, to be observed during the time of her being great with foal. We are told by Aristotle, that the Scythians used to travel their mares great with foal, when they perceived the foals to stir, believing they would foal the easier; but good heed must be taken that the belly of the mare be not bruised or hurt, when she is so forward with foal, least the foal and the mare both become sufferers. So that the best judges never suffer a mare in that condition so near foaling, to undergo any hard labour, but to be rid gently now and then by a person that can be trusted, may do no disservice. The young foals for a month or more after their birth should not be handled, for they are hurt with the least touch that may be; and if the mare foals in the stable, be sure to give her room enough, least she overlay the foal. Some of our ancient writers advise us to be early in the bringing our horses to be familiar with us, which will keep

keep them from fear and startings; and also to make them acquainted with every thing that looks frightful, or sounds terrible, which will make them useful, without being dangerous to our selves, when we have occasion to use them. Xenophon tells us, that as we are men, we must provide schoolmasters for children, and likewise teachers for our horses; for let them spring from never so good a race, yet without education they will be only fit for the plough. The masters or teachers of our horses, may according to their several dispositions train them up to be excellent; if they are such as are proper for draught or carriage (to be nice in the matter) let their harness be placed near them, a little before we begin to break them, that they may be acquainted with it, and the gingling of the bells and chains; and especially if we take them from a wild breed, as from a forrest, &c. for else they will be resty, and difficult to be brought to labour. Let them likewise have easy work at first, till by degrees we find out their strength; for to put them to any work beyond their strength in the beginning, will either be a means of straining them, and weakening them all their lives after; or else of baulking them, which is almost of as bad consequence; for if they are baulked at first, they will never

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use their strength afterwards in any considerable pinch of hard work. I have known many a young horse of good nature that has been spoiled thus, either through the over-hastiness of his master, or through the master's covetous temper; that is, by putting fewer horses in his teame than the nature of the work required. There is great profit made in some counties in England, by the the farmers, in buying of colts of Leicestershire and Northamptonshire, when they are about two or three years old, and working them till they are about six, and then selling them for the coach for such an advanced price, as well pays for their keeping, besides the benefit they have had from their work.

THE most skilful among these farmers will not buy them to remove them home to their farms in other countries, till they are about three years old, because they imagine a colt, while he is in the first season of his growth, should be kept in the same air, and to the same diet, as near as possible, which will make him thrive the better; and certainly change of air and diet make great alterations in all animals, especially when they are young, or before they have thoroughly forgot their dams. The third year they grow most, and begin to be well brawned, and till that year be passed, they should

should by no means bear any burdens, not even then should be but tenderly used that way. The ancient writers of husbandry would not have them bear any great weight till they are five or six years old, lest they get a strain in the back: the horse however is allowed to draw in gentle work at three years old; and they tell us, with good reason, there is less danger in putting a horse to draw, than to carry great burdens. When we first put a young horse to draw, take care that he be even matched, lest the stronger spoil the weaker; and by no means let a young horse draw with a jade, for while we are obliged to use severity with the jade, the young horse expecting the same usage, will force himself beyond his strength; which is all I shall observe concerning the breeding of horses. But the gelding is in some cases to be preferred to the stoned horse, the gelding being generally less vicious, and therefore safer to be used upon the road, or in such places which are frequented by mares, especially in the spring and summer season. It is necessary to observe, that if you would have a good gelding, you must cut a good horse, for if the horse be bad, the gelding will not be otherwise. The time of gelding a colt is when he is a year old, rather later than sooner, for much sooner than a year, it is difficult

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to cut him clean, and may perhaps spoil him into the bargain; but after that, it is no uncommon practice to geld horses, till they are six, or seven years old; for some are so unruly that their service is always dangerous to us. Horses should likewise be in good plight when we cut them, for we must not expect them to better themselves after they are cut. As for mares, they have sometimes been spay'd, but that is a work which can be of little service, unless for the time we use them upon the road; and it is also a very difficult operation, and very dangerous to the mare, so that it is indiscreet to attempt it: besides, if a mare happens to be lame, or may prove by any accident unfit for our service, if she comes of a good breed, and possesses good qualities, the colts she may bring us will pay sufficiently for the expence we shall be at for her keeping.

I now come to speak of stables, the structure and situation of which should be consulted with judgment. The nature of a horse must also be well consulted that they may be as commodious as possible to preserve his health. First then take care that your stable be built in a dry place, and well pitched at the bottom with round paving stone, or with Dutch bricks, or claspers, which is still better; for though an horse can endure the wet ground when he is abroad, without

without taking harm, yet in the stable where he is debarred from exercise and free air, a damp bottom for him to stand and lye upon, will give him cold. Xenophon would have a stable lightsome, because he observes that an horse kept in a dark stable, being brought into the light suddenly, his eyes will dazzle, and by frequent change his eyes may be injured : it is certainly the most natural way to let him have light in the stable; and also it is as adviseable to have the stable large enough to hold a good body of air when it is shut up close; for where a due proportion of air is wanting, the horses will sicken; therefore all possible means should be contrived to give them fresh air while they are in the house, and keep them as cool as possible in summer, and rather warm than hot in the winter: and for these reasons a stable ought to stand with the back to the south, and the front, with the windows, towards the north; so that by opening them in summer, you may let in the cool air, and keeping them shut in winter, the stable will be warm. But besides this close stable, there is another contrivance for keeping of horses, which is now used by gentlemen of good understanding; which is, to build at the corner of some large pasture, a shed, to be open on one or two sides, and well covered with thatch, the eyes of the

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thatch to be juſt high enough from the ground for an horſe to go in ; this is for our horſes chiefly in the winter, when they may have the liberty of the paſture to feed when they will, and of dry meat and ſhelter when they have occaſion for it. By this means the horſe's feet are kept cool, and his legs not ſubject to ſwell ; his blood kept in good order, and he will not be ſo apt to catch cold : this method is found to be of good ſervice to hunters eſpecially, and gains ground a-pace. Where we erect ſuch a place as I ſpeak of, we muſt be ſure to place it where there is good water, that the horſes may drink at their own pleaſure, for it is when they are enclined to drink, their water does them the moſt good ; and then likewise they do not drink too much at a time, ſo as to chill their gutts in winter, or to fill themſelves too full in ſummer : and it would certainly be much better, if thoſe horſes that are kept in the houſe were to be watered three or four times a day, rather than twice as we always do in England.

BUT we muſt obſerve further, that thoſe hunting or travelling horſes, which have the liberty of ſuch a ſhed and paſture as I have been ſpeaking of, muſt be taken into the ſtable the night before we are to hunt, or ſet forward on a journey, and returned to the ſtable again, after hunting or travelling,

ling, and remain there till the the morning following, for their blood will be too warm to venture them abroad the same night.

BUT it is necessary we say something of the dressing and feeding of horses; for good rubbing, currying, or dressing, is judged to do a horse as much good as his meat; and this should never be neglected morning and evening; and whenever he comes from travel, or a journey, then especially horses should be well rubbed down with straw after their legs are washed, and their girths a little loosened, at the first coming into the stable, but the saddle not taken off till the horse is cool, which may be sooner or later, according to the exercise he has had; sometimes it should remain on two hours, and sometimes less; and be sure he is well curried and dressed afterward, and littered well with clean straw, not forgetting his feed of corn, which should be of oats and beans, but some horses will not eat the latter; they are warm and heartening, and strengthen a horse very much after hard labour. It is necessary also to observe, that in travelling long journeys we should set out gently, and not press our horse too hard while he is full, nor a mile before he comes to his journey's end, that he may come cool into the stable, and never let him drink when he is hot, unless he will drink ale that is well brewed and

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and clear, for if the yeast is in it, it will gripe him; this yeasty drink may be easily known, because it will be troubled and thick. Bread is also a great strengthener of an horse, but it must not be given him while it is so new as to be pressed into a paste, nor if it is made with leaven: about a quart of ale, if it is not sower, will be enough for a bait, and a pennyworth of bread. But this is, however, not to hinder him from his due allowance of corn, when he is put into the stable; and the ale and bread need only be given when we have travelled our horses very hard, and cannot allow them time to stay for a bait of corn.

It is likewise necessary to consider the proper times of the horses feeding with corn, when he is at home, that they may be regular, for neglecting this injures a horse. I am of opinion that when his time of feeding with corn comes, and he is disappointed of it, he pines and loses his flesh; and bad usage this way is the occasion sometimes that horses fall from their stomach, and decline more in three or four days, than can be regained in a fortnight's regular feeding. Yet there are now and then some men so inconsiderate, that they will keep an horse out upon a journey a whole day together without giving him a mouthful of hay, and perhaps let him stand abroad

abroad half that time in rainy weather, or in frost or snow; this is a great hardship imposed on so noble a creature. And while I am speaking of this cruelty which an horse suffers, I cannot forget another barbarous practice which some men use to their horses in another way, and that is the violent beating of them, and especially about the head; this, perhaps, may by way of excuse be done in passion, but I never knew this attempted, but the horse was always in the bridle, the halter, or the harness, and so safe that he could not return the violence; and therefore I esteem such men to be of cowardly dispositions, and for their barbarity should be debarred the liberty of conversing with any creatures better than wild beasts, or else they ought to wear some mark of infamy, whereby they may be distinguished and avoided by all mankind; for where the barbarous spirit appears in any one, tho' in never so trifling a case, it is most certain the same evil disposition will at some time or other shew it self in a greater thing. I am perswaded many a good horse has been spoiled by such vile practice, not by the masters, perhaps, but by servants.

BUT to return to the good feeding of an horse, it is necessary to observe that the softer and lighter meat is the best for
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young horses, and the dryer and harder meat the most proper for the older horses. grass, chaff, and hay is the most convenient food for colts or young horses, and is the greatest variety of food which we ought to allow them; but for those which are fit for labour and much travel, and are used frequently, the food must be dryer and harder of digestion; chaff is good even to these, and some use chaff and pease together; or the bitter feed is oats, of which there are several sorts. The Poland oat is large and very profitable, and next to that I should chuse a good black oat; for the black oat is commonly a fuller oat, and yields a more substantial food than the common white oats generally do. The best way to judge of oats, how far one sort will nourish more than another, is to measure a bushel of each sort, and weigh them, and the heaviest is certainly the best; but then care must be taken that they are dry, and well cleaned, and especially that they are not the least musty, for then your horses take a distaste at them; and tho' perhaps they will eat them, yet they will not thrive with them; for whatever your horse eats without a good appetite, or good liking, does him no other service than barely keeping him from starving. Good hay likewise is a material article in the keeping of horses, and the up-
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land hay I prefer before all others, if it be well made, and well got in: the hay of the lower grounds may likewise be very good, but there is not so much nourishment in it, as in the short hay of the uplands; and likewise the hay that is cut from low grounds, if storms of rain happen to come a little before the cutting, it is commonly filled with sand; and as hay is the most constant food of horses while they are housed, so that especially should be as good as we can get. In Flanders it is common to feed their fine horses with wheat-straw, cut small with an engine, which is a delicate food for keeping the body clean, which also is one of the qualities of chaff; for chaff nourishes but little in comparison of full corn, but cleanses the blood, and keeps the body in good order. Barley is also very fattening to horses, and rather than a horse after hard labour should want his feed of corn, it may be given him, but it is more costly than oats. Wheat, bran and oats mixed is also a good bait for an horse, and horse-beans mixed with them makes that feed still the better. Grains of malt while they are fresh may be given to horses, they will feed heartily upon them, and they will make the horse appear fair and fat, provided he is fed with them a week or ten days, but the fat he seems to get by this feed, is not of any

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any substance or duration; however it makes a horse appear well in a market, and many are deceived by such fed horses.

IN the spring there is a custom to soil horses, or scower them with fresh grass cut, and given them in the stable; or clover, or such like, which those who practise it tell me it cleans their bodies, and cools them, so that they are not subject to swell in their heels, or other distempers which generally happen to horses that are kept to high food in the house. In the hotter countries they do the same to their horses, but instead of grass, which is not very plentiful, they use the blade of green wheat or barley, which they mow before there is any appearance of jointing in the corn; but in countries troubled with wars, the foragers have no regard to that, but mow down any sort of grain, whether it be wheat, barley, oats, &c. and give it to their horses in every degree of growth, whether in the blade, in the green stalk, or in the green ear.

IF we make a studd for horses, we should lay our pastures into large severals, and contrive it in such a place where there is variety of situation, some low and some high grounds, rather champain than woody, with soft sweet grass, rather than high and flaggy; but be sure to have store of good water, for that is as useful to the horse as
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his meat; if the grafs be very short, the horses will sooner wear their fore-teeth.

SOME are against giving a horse grafs in the spring, but in June, or about the fall of the leaf: others tell us it is best to give your horses grafs with the dew upon it, and at night give them oats and hay. But this manner of feeding horses I dislike, because the grafs which is eaten in the morning, will put the body in a condition of carrying off the corn and dry meat, before the horse can receive a due nourishment by it. And besides, grafs being the most natural to an horse, he may, perhaps, have the less affection for his dry meat, and consequently his dry meat will do him less good, if the grafs was not to carry it off, before it had duly given him its nourishment.

BUT to return to the horse in the stable; some would persuade us, that after horses have laboured hard, the best feed for them is oats, chaff, and chopped wheat-straw; and that this should be given them in a manger placed so low, that they may come at their meat with difficulty, judging that this method will make their necks the stronger, and they will be the fitter for the draught; and besides that, they will press more upon their fore-feet, which they suppose will make them the stronger. But I can-

cannot conceive what necessity there is for this hard usage, since it is so natural to suppose, that every creature receives more nourishment from his meat when he eats it with delight, than when he eats it with uneasiness; and I believe most people are of my opinion in this point, because all the mangers that are now built are made as commodious for the horses eating as possible. 'Tis to be observed, however, that whenever we give an horse any corn, let it just before it is given him, be well sifted and cleared from dust, and the manger likewise well swept.

I have heard of some horse-couriers who feed their horses with sodden rye, or beans, a little broken in a mill, and sodden, which make their horses appear fair at the market; but this sort of food is not proper for labouring horses, for this yields infirm flesh; but oats and good hay keep an horse sound, and fill him with wholesome flesh.

IN the feeding of horses, 'tis advisable to use the same method I have prescribed for watering of horses; glut them not with too much meat at one time, rather give them little and often. But when you do this be regular in the hours of feeding, as I said before, while they stand in the stable; but when they travel feed them seldomer, and more at a time. We may know a
horse

horse is in health by his good appetite, and the better he feeds, the fitter will he be for labour; however, be sure to remember that though your horse have a good appetite upon his coming into the stable, give him no oats, or such like provender, while he is hot; but hay, if it be good, he may eat when he will, first taking care to shake it well from dust, and to see that there are not the feathers of any fowl among it.

It is said, that a fox's tale being hung up in the hay-rack, will keep the horse, though never so hungry, from touching any of the hay, although the hay is good in its kind; but I have not tried it, I am only informed it is the practice of some poor inns, to prevent the horses from eating any hay at all; but if this be true, which is yet uncertain to me, we are assured that a goat in a stable among horses, is pleasant to them, although he is never so rank to the smell; and it has been affirmed, that a goat being among horses, will preserve them from pestilential distempers.

THERE is another remark necessary to be observed concerning an horse when he comes home hot from travel; that if there is any convenient walking-place for him, let him be covered with a cloath, and walked about gently, till he is cool, before he is put into the stable; and when he is set up, litter

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him well, lest the cold of the stable floor happen to distemper him. And when he is very hot at his coming home, suffer him not to be washed till he has had sufficient time to cool, and then use him as directed before. There is an old receipt which tells us, that if an horse loses his stomach by hard travelling, it is good to rub his teeth well with garlick and pepper stamped or bruised together.

IN watering horses, a clear water is good, if they do not labour, as some tell us; but if they labour hard, a troubled water is the best; such as the water of the river Thames about London, agrees very well with the horses that work much; but the water of ponds or rivers that are upon clear bottoms, horses delight to drink, and few waters do them harm, unless they be such as are upon sharp chalks, and the waters in stagnant pools; the first by riding them in only, crack their heels, and is apt to gripe them; and the latter, which is the stagnant water, is commonly full of insects, and will give them a sickness that may likely occasion their death, especially if they drink of it in summer time, when the weather has been hot and dry for some time, for then such waters will be crowded with insects of a dangerous kind. As for water that comes from a well, or runs under ground, it ought to be drawn several

several hours before it is given to horses, and must be exposed to the air and sun; for as it comes fresh from the spring, it is too raw and cold for the horse's stomach: the waters which proceed from a gravel I should rather chuse than any other, where we draw from wells, or underground waters. Aristotle bids us to take care of our water for cattle; for as he observes, let them feed never so well, if they have not good water, their meat will not do them half the service; and the same author pretends to maintain, that an horse can live well enough four days without drink; but it is, in my opinion, a dangerous trial; if he can live so long, it must be when he has good grass before him.

I HAVE read, that in watering of horses, if they be lean, we ought not to let them go into any water higher than their knees, but if they are fat they may go deeper; and there are others who will not allow young horses to go so deep, that their Testicles shall touch the water, although they are in a state of the greatest prosperity.

IN the spring, about March or April, it is good to ride them frequently through waters, especially in clear rivers; 'tis a good exercise for their legs, and the cold water restrains any humour from falling into them, and preserves them from windgalls; but always

ways after this exercise, let their legs be wiped well with clean straw as soon as they come into the stable, or else the damp rising from the stable-floor, will occasion an inflammation, as I have heard. It is said also, that those horses which are used to drink of the clearest streams, are the most hardy travellers; but I suppose it is where gravel is the foundation, without any mixture of other minerals; for the more simple any water is, or any diet is, so much stronger and healthful will be the body; and to keep an horse for ones use, oats, hay, and good water should be his diet, and nothing else; and with the observance of those rules which I have already given, I am persuaded horses may last to the utmost of their natural time, without distemper,

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